THE METAL INDUSTRY
WITH WHICH ARE INCORPORATED
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REMINISCENCES OF A SILVER FLATWARE SUPERINTENDENT.

EARLY EXPERIENCES IN LEARNING TO MAKE SPOONS, KNIVES, AND FORKS.

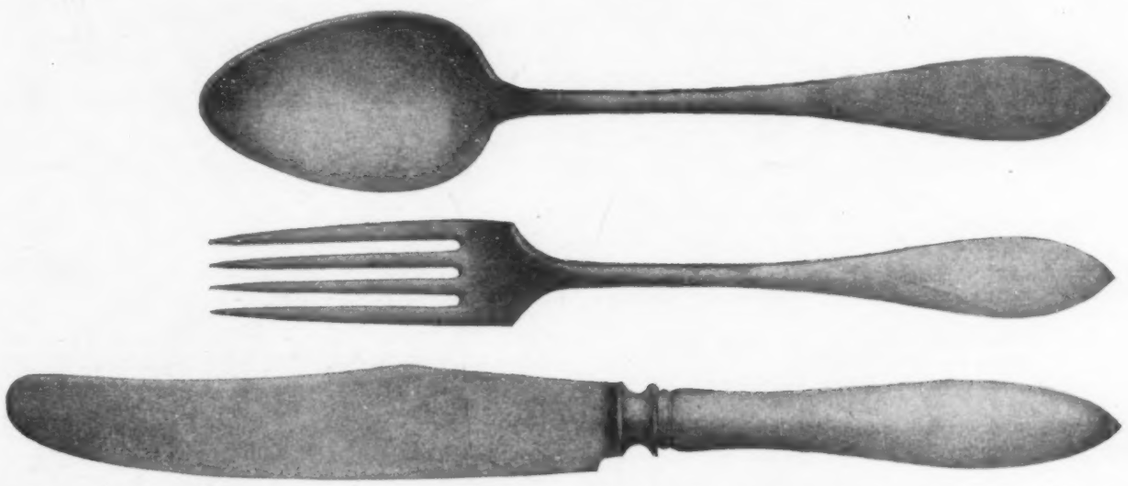
BY C. W. COOKE.

My first lesson in spoon and fork making was when I was ten years of age, with the Chas. Parker Company, Yalesville, Conn., which is my home today. I started to work in the factory mornings and nights for about two years, attending school from 9 a. m. to 4 p. m. My hours at the factory were from 7 a. m. to 8:45 a. m., when I hurried home and got ready for school at 9 o'clock, and after school closed at 4 o'clock I went to the factory and worked until 5:30, also many times after supper until 9 o'clock. In addition to my school and working hours I, with my older brother slept in the shop, getting up at 5 o'clock in the morning to sweep out the factory, build fires and oil shaft bearings, etc. My father had the contract for a number of years for watching or staying at the factory and getting ready to begin work at 7 o'clock in the morning. My father always went down with brother and me when we went to bed at night, and went around the factory to see that everything was all right. When about twelve years of age I left school and started in working all day.

C. W. COOKE.

My superintendent, Mr. Orrin Jeralds, was a grand old man, and one of the pioneers in the manufacture of German silver spoons. He was a fine mechanic, and whenever I could I followed him around to find out what he was doing and why he did it. When he saw that I took such interest he took great pains to show me all he could, and generally called on me when he wanted help about hardening dies, rolls, etc. Mr. Jeralds then had the contract with the Chas. Parker Company to make, trim and finish all the German silver flatware they manufactured. I never asked Mr. Jeralds for a raise of pay, but the few years I was employed by him he advanced my wages every few months. I tried and believe I did earn for him all he paid me. Mr. Chas. Parker came down to the Yalesville factory every week—sometimes more often. He was a fine old gentleman. We used to call him "Uncle Charles." He always had a kind word for every man and boy he knew. Many things he said to me I shall never forget, and I am sure his advice has been beneficial to me in many ways. Sometimes Mr. Parker would say to me: "Be sure you are right, and then go ahead," and again, "Keep your tools sharp," and sometimes it would be, "Always keep your machine well oiled."

Mr. Parker was a gentleman of the old school, and many others of the same stamp as himself were such as Samuel Simpson, I. C. Lewis, Horace Wilcox, Robert



SAMPLES OF MODERN SILVERWARE. LAFAYETTE DESIGN MANUFACTURED BY THE TOWLE MANUFACTURING COMPANY. NEWBURYPORT, MASS.

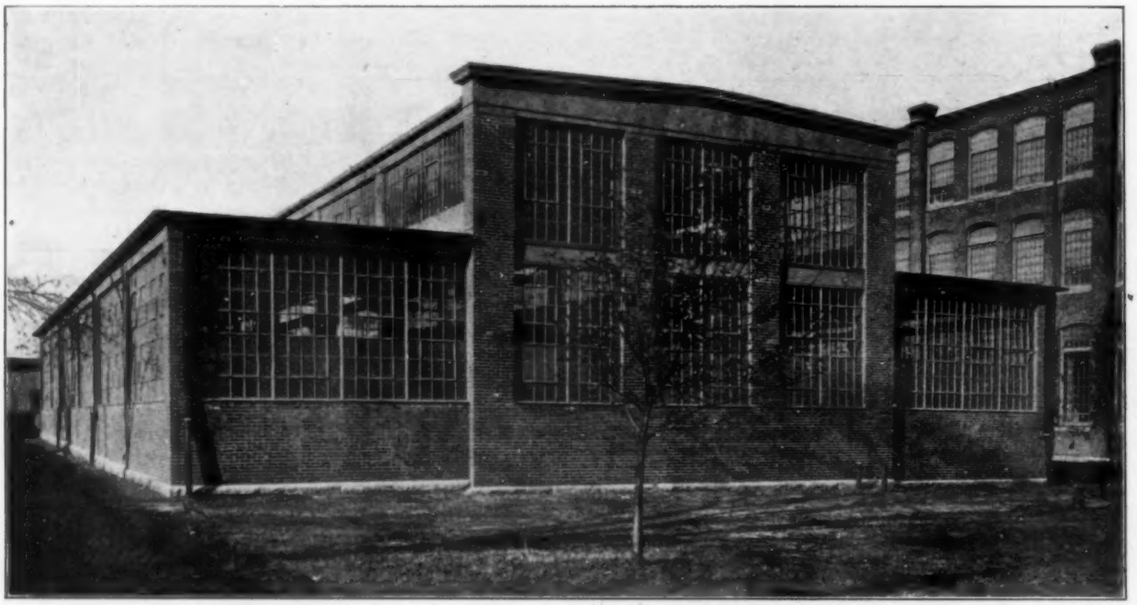
Wallace, and G. I. Mix. Many others could be mentioned who built up by their own efforts and sterling honesty such foundations in their individual business which their successors may well be proud of. After leaving the Charles Parker Company I went with my former superintendent, Mr. Orrin Jeralds, to the Derby Silver Company, Shelton, Conn. After Mr. Jeralds gave up his position with that company I stayed with them for about two years as foreman of the making department. After leaving the Derby Silver Company my next position was with the Rogers & Brittin Silver Company of Bridgeport. The Rogers & Brittin Company soon sold out to Col. Holmes of New York and Mr. George C. Edwards. These gentlemen began the manufacture of German silver flatware under the name of the Holmes & Edwards Silver Company.

Under the management of these gentlemen the growth was very rapid—in fact, astonishing to the trade—and the older concerns soon began to realize that there was something doing in Bridgeport which required new energy and hustle to keep pace with the new concern in the manufacture of flatware. The writer, while with the Holmes & Edwards Silver Company, saw the business grow from a beginning of ten gross a day to 150 gross per day of spoons, forks and knives, all finished ready to market. Col. Holmes died some years since. God bless his memory; a better man never lived. Since then Mr. Edwards has been the head of this company, and brought about its wonderful growth, together with its power and influence in the silverware business of this country.

Leaving the Holmes & Edwards Company, I accepted a position with Mr. Geo. M. Hallenbeck, of Wallingford, Conn., taking the contract to make, trim and finish German silver flatware for one year. Mr. Hallenbeck's business was of rapid growth from the beginning. We manufactured German silver flatware in what was known as the Hall, Elton factory, in Wallingford. After my contract with Mr. Hallenbeck expired I returned to Bridgeport under a five-year contract with the Holmes, Edwards Company, with whom I had previously been connected so many years. Coming again to Wallingford in 1893, I engaged myself with Mr. Hallenbeck, who had continued business in the old Hall, Elton plant. On my return with Mr. Hallenbeck we still continued making goods in the old Hall, Elton factory, until the property was sold. Mr. Hallenbeck at that time was well and honorably known to the trade, and had built up a good business. After closing the old Hall, Elton plant, Mr. Hallenbeck bought out the Wallingford Wheel Company plant in Wallingford, fitting this up for the manufacture of flatware. Mr. Hallenbeck for a time individually continued the business he had established.

Then the Simeon, S. L. & George H. Rogers Company was formed, with Mr. Hallenbeck's factory in Wallingford and a factory in Hartford, Conn., as the manufacturing and finishing plants of the company. Under the management and personal direction of Mr. Hallenbeck this company has grown to a strong and solid company in the silverware business. Mr. Hallenbeck is the president and general manager of the company. The business is fast outgrowing its present factory capacity.

The writer, from the time he first started with the Chas. Parker Company until now, has personally become familiar with every operation in the making, trimming and finishing of spoons, forks, knives, etc., and if my energy, ambition and honesty of purpose have been a factor in the upbuilding and success of the companies with whom I have been connected, I am heartily glad. The labor, though ever wearing on mind and body, in the years that have gone, has been a pleasure to me, and it is a great satisfaction to know I have been a spoke in the wheel of progress in the manufacture of silverware.



GORHAM MANUFACTURING COMPANY'S NEW ERECTING SHOP.

The building shown in cut is the new erecting shop just completed by the Gorham Manufacturing Company, silver and gold smiths, of Providence, R. I. The building will be used for the erecting and assembling of the large bronzes, figures, etc., that the Gorham Company are continually turning out.

The building proper is 120 ft. 6 ins. x 78 ft., with link, 40 ft. x 57 ft., connecting the main building, also a small room, 29 x 11, adjoining this link for toilet room. The shed and connecting link has a head room of 16 ft. and 25 ft. in the clear story. The framing of the building is of steel with trusses to support the clear story roof, resting on H-shaped columns, and the shed roof with steel I-beams from these columns to the brick walls.

METALLURGY FOR GOLDSMITHS AND JEWELERS.

AN ARTICLE GIVING A DETAILED DESCRIPTION OF THE METHODS PURSUED IN ENGLAND IN THE PREPARATION OF ALLOYS OF THE PRECIOUS METALS.

(Concluded from September.)

BY "ARGENTUM."

14 CARAT AND 13 CARAT.

Golds are of service in making articles which are to be colored in finishing, but which it is not desired to hall mark. They are usually of a "red" color, pale gold of such quality being almost unknown. Much of the old jewelry was made of about these qualities, and, when properly colored, was practically indistinguishable from 15 carat. The alloy consists, often, of 2½ parts of silver to 7½ parts of copper, with 14 parts of gold for the higher quality, and about the same relative proportions of silver and copper with 13 parts of gold for the lower one.

12 CARAT.

This is the next quality which can be hall marked, and it is also the lowest quality which will color effectively. It is not in very great demand just now, very little 12 carat being sent to the assay offices. A good alloy contains 12 parts gold, 3 parts silver, and 9 parts copper.

9 CARAT.

In this quality there is almost unlimited variety in color, malleability, ductility, etc., obtainable by the use of different metals, in varying proportions, in the alloy. If silver only is alloyed with the gold, the resulting 9 carat is white in color, very soft and easily worked, but of very little service to manufacturers except for making medals. By the substitution of copper, in increasing proportions, for part of the silver, the gold becomes deeper in color, and also becomes less malleable until the proportions of silver and copper are approximately 2 to 3, when a further addition of copper renders the gold more malleable again, and it becomes redder in color, the 9 carat containing only gold and copper, being almost as red as the latter metal itself. If composition is introduced into the alloy, the color of gold produced varies from the yellow of the alloy, containing equal proportions of yellow "compo" and copper, together with silver, to the deep red of that in which red "compo" and copper are included. The yellow 9 carat made in this manner presents certain difficulties in manufacture, as it is rather hard, but it has been adopted, on account of its close resemblance in color to 18 carat gold, for making into plain articles such as match boxes, etc.

The relative effects of silver and spelter in altering the physical properties of an alloy of 9 carat have yet to be actually determined, but the latter metal has a greater hardening effect than the former, without causing so much difference in the color. Another property which largely depends upon the proportion of silver present is that of resistance to the action of acids, for while the alloy which contains a fair proportion of silver will only turn brown in color when tested with nitric acid, one containing a large proportion of either spelter or copper will boil up. The tarnishing effect of exposure to the air is probably also dependent upon the proportions of these three metals, silver exercising a "protective" influence and so neutralizing, in some measure, the tendency of the copper and spelter to oxidize.

The bulk of the 9 carat gold articles manufactured at present are made of a red colored gold, such being soft and tough, and so well adapted for stamped articles such as brooches, hollow rings, etc. For brooch pins, safety pins, etc., a harder gold is necessary, and so more silver is contained in the alloy, in the proportions previously stated. For pearl setting it is preferable to use a pale gold of a somewhat yellow color, but as it must also be soft, the use of spelter is impossible. There are such alloys made by some jewelers and bullion dealers, and some of them have proved very satisfactory, but the exact composition of such is not allowed to transpire.

Quite recently, a so-called "solderless 9 carat gold" has been placed upon the market, and is recommended for the manufacture of hollow wares in which the two halves have to be soldered together. This is really a gold and solder plating, the one side of which is gold as ordinarily used, while the other side is gold solder of the same quality. In making into articles of jewelry, the two parts of the article are stamped or cut out in such manner that the two solder sides will be adjacent, when heating with the blow-pipe fuses the solder and so fixes them together. This obviates the use of any loose solder, and hence saves time in the process of manufacture, but naturally this solderless gold is more costly to produce than ordinary sheet, which hinders its general adoption by the jewelry trade This gold is doubtless the outcome of the assay office regulation to the effect that the solder in 9 carat and 12 carat articles must be of the same quality as the gold.

BRIGHT GOLD.

This term is applied to gold of a quality below 9 carat. Three qualities are in common use, and they are distinguished by the prices at which they are sold by the refiners, namely, 307, 257, and 201 gold. The quality varies from about 8 carat down to 5½ carat, and each quality is obtainable in red and pale colors. As a rule, a fair proportion of silver is included in the alloy, as this enables the gold to stand the acid test somewhat better, and the alloy is made up of silver and copper only. Bright gold is not now used very largely except for repairs, and also for making brooch pins, hat pins, etc., where a hard, cheap gold is requisite.

ROLLED GOLD AND GOLD PLATE.

These materials are prepared by "sweating" together two bars, one of gold and the other of base metal, and then rolling the resulting bar as may be desired. The gold bar may be of any required quality, and the relative thicknesses of the gold bar and the metal bar are arranged in such proportions as to produce a plate of the value necessary for the particular articles which are to be made from it. The main constituent being base metal, the price is much below that of any ordinary quality of gold, and many goods are now made at very low prices, which present the outward appearance of real gold, and which will, in many cases, wear for a considerable number of years before showing the base metal.

GOLD SOLDERS.

Solders are, in most cases, of lower quality than the gold with which they are used, but, as previously mentioned, 9 carat and 12 carat goods, to be hall marked, must be soldered with solder of the same quality as the gold. A common method of preparing solder for any particular quality of gold is to melt some of the gold scrap with a certain quantity of fine silver, this addition reducing the melting point sufficiently for the purpose, while there are also a number of solders stocked by re-

finers, suitable for the different qualities of gold. Thus there are 18 carat solder, which rarely exceeds 17 carat in quality, "colored" solder and "easy colored" solder suitable for 15 carat, 14 carat, and 13 carat goods, and, of lower quality, 12 carat, 9 carat, and bright gold solders, some of which are as low as 12/- per oz. in price. In all cases, there is a considerable proportion of silver present, while the lower qualities may also contain spelter or cadmium. These metals are of special assistance in making 9 carat solder of full quality, but low melting point, the addition of only a low percentage having a considerable influence on the melting point.

THE MELTING AND CASTING OF GOLD.

The melting and casting of gold are operations which require more care and skill than is often considered necessary. Alloys of gold, if in any quantity, are best melted in a crucible, which may be made either of fire-clay, plumbago or silica. Ordinary fire-clay crucibles are not so good as plumbago crucibles, as these last much longer, can be heated more rapidly, and tend to preserve a non-oxidizing atmosphere during the operation. Silica crucibles are of recent introduction. They possess certain advantages, being very rapidly heated, and presenting a very smooth surface from which the metal can all be poured out, while, if used only for melting in which no flux is needed, they last a long time. The presence of any alkaline flux has, however, a corrosive action, so that they are not suitable for this class of work, especially when their high price is taken into consideration. Whatever kind of crucible is used, the jeweler should be most careful to mark each crucible with the quality of the gold which has been melted in it, and to keep a particular crucible for each quality as otherwise the quality of the gold may be altered by small shot, etc., from the previous melt having adhered to the sides of the crucible and melting again with the next lot of gold.

METHOD OF MIXING THE METALS.

The different metals should be put into the crucible in such order that the most easily oxidized are at the bottom, and the whole should have powdered charcoal placed on the top, when there will be very little oxidation during the operation of melting. The crucible is now placed in a good fire, the best fuel being patent coke, which is in every way more satisfactory than gas coke, giving a higher temperature and producing less sulphur fumes. The furnace may either be one of the portable forms of melting furnace, such as Fletcher Russell's or Carr's, or it may be a fixture, but it should be of sufficient size to allow of a good layer of coke all round the crucible, and of such depth that the top of the crucible is not above the level of the draught hole into the flue. The flue must open into a fairly high chimney, in order to secure a good draught, but the draught should be controlled by a damper in the flue, as different temperatures are advisable in melting different qualities of gold. Thus 9 carat requiries a moderate temperature, as, if melted at too great a heat, the loss is liable to be considerable in consequence of oxidation, especially if any composition is included in the alloy, while there is a great probability that the ingot will not be quite sound. With 18 carat a good bright heat is better, decidedly higher than when melting 9 carat.

In addition to furnaces burning coke, there are a number of appliances in which coal gas or some liquid fuel can be used, and with such furnaces gold can be melted very rapidly, as the full heat is very soon attained. Furnaces burning liquid fuel are, however, very little used by jewelers in this country, and those in which gaseous fuel is consumed are not so satisfactory for continuous work as coke furnaces, the products of combustion having, apparently, some deleterious effect upon the gold. Occasionally small melting appliances, in which the gold is melted in a shallow plumbago or charcoal crucible, fixed in front of a blow pipe in which coal gas is burned, are used, but the proper admixture of the metals must be a matter of some difficulty, and the oxidation must be excessive.

In whatever sort of furnace the gold is melted, it should be well stirred with a plumbago rod before casting, in order to insure the thorough mixing of the constituent metals, and then poured, in a steady stream, into the ingot molds. These are usually made of iron, and should be warmed before use, but must not be made hot, for either too cold or too hot ingot molds will produce bad ingots. The molds are made of different shapes, suitable for producing bars which can be used for sheet, slit, and wire, respectively.

WORKING THE INGOT.

After removal from the mold, the ingot must be trimmed and filed up before rolling or drawing, in order to give straight smooth edges and prevent cracking along the edges. In rolling the gold, or in drawing it into wire, the process depends upon the nature and quality of the alloy under treatment. 22 carat gold is soft and ductile, so it can be rolled into sheet or drawn into wire with ease, while 18 carat presents little difficulty, except with a very red alloy, which tends to crack. 15 carat, 14 carat, 13 carat, and 12 carat are all harder in character, and require more frequent annealing, and also more gradual reduction in thickness. With 9 carat gold particular attention must be paid to the nature of the alloy, for while the red gold is soft, tough and ductile, the "yellow" variety soon becomes hard under the rolls or in the draw plate, and frequent annealing is essential. This repeated annealing results in considerable loss in weight, especially when the gold is rolled into very thin sheet, and as the loss is due to oxidation of some of the copper and zinc in the alloy, the quality of the gold improves during the process, so that gold which is slightly under 9 carat when in the form of a bar may be above this quality when rolled. The use of an improved annealing furnace, in which the gold is annealed in a reducing atmosphere, prevents this loss by oxidation, but, owing either to increase in cost or in the time necessary for the operation, the furnace has not been generally adopted.

The rolling of bright golds, below 9 carat in quality, is similar to that of 9 carat, but as these rarely contain zinc, the losses in rolling are not quite so heavy.

For making into wire, the gold is usually cast either into a square bar, or into a thick, narrow bar, which is rolled down to a suitable thickness and then cut up by a slitting machine into long square strips. Either bars or strips may be passed through rolls which give them a round or half-round shape, or may be drawn through plates without any intermediate treatment, but great care must be exercised in order to avoid the making of "spilly" wire. In drawing square strip through a round or half-round hole in the draw-plate, the edges are sometimes turned over and flattened down on to the surface of the wire, producing a thin layer of the gold on the outside of the solid wire. Such should always be looked for after drawing through the first two or three holes in the plate, and should be carefully and completely filed away, when the continuation of the drawing will yield a clean, smooth wire. It is to be feared that this use of the file is often neglected, under the impression that the bad parts will be drawn out as the operation proceeds, but such neglect may mean that the defect remains, and is only discovered when the article into which the wire is being made, is almost completed, with the consequent

rejection of the article and the waste of the time devoted to its manufacture. Different patterns of wire are made by drawing the gold through plates with holes of the required shapes, while wires with an ornamental design upon them are made by passing a suitable strip or wire through a pair of rolls, on one or both of which the pattern has been cut.

TREATING THE SCRAP.

The sheet or wire having been obtained of the requisite size and shape, it remains for the jeweler to manufacture them into articles of jewelry, and during this process he produces various waste products, such as scrap, lemel and sweep, which, being of value, must be so treated as to yield the best returns. Scrap may either be melted up into a bar for rolling, or returned to the refiner to be credited, as may be considered advisable. In melting scrap, care must be taken to prevent, as far as possible, undue oxidation during the melting. The scrap should be cut into small pieces, so that it can be packed well into the crucible, and then well covered with powdered charcoal, when, with a proper regulation of the temperature in order to insure rapid melting without overheating the gold, the loss will not be serious. There is invariably some slight loss due to oxidation, and consequently there will be an improvement in the quality of the gold, so that scrap bars should always be assayed before being used again, as the quality may be higher than is needed, and it will be profitable to re-melt it with additional alloy in order to reduce it to the required standard. Further, through the accidental admixture of some scrap of a different quality, or even of some silver or base metal scrap, the quality may be either above or below the required standard.

MELTING THE LEMEL.

In the melting of lemel, the method pursued depends upon the proposed destiny of the resulting bar, that is, whether it is to be sold to a refiner, or made up again into jewelry. If the former, the lemel should be first heated upon an iron pan, in order to burn off any grease, shellac, or other combustible material when such is present, and then, after allowing it to cool, mixed with the requisite fluxes. It is practically impossible to give even general rules as to the most suitable fluxes, as jewelers' lemels vary so widely in character, some being simply filings from the work, while others will contain setters' and engravers' cuttings, etc.

Some of the refiners and manufacturing chemists sell "Universal fluxes," which are usually successful in reducing lemel under any ordinary conditions, and, apart from these mixtures, there are borax, soda ash, flourspar, niter, sal ammoniac, sand, common salt, etc., any of which may be used as required. Most lemels can be best treated with a mixture of two or more fluxes, and this course enables the melter to prevent the crucible from being corroded overmuch by the action of the flux. Thus the alkaline fluxes, such as soda ash, carbonate of soda, etc., tend to corrode the crucible, and will even sometimes pierce the side, while silica, and even borax, tend to diminish such action. Probably most jewelers will find it best to use a mixture in which the alkalies predominate, such as 2 parts of carbonate of soda to 1 part of borax, with a little niter to remove the last portions of combustible matter, and to add an equal bulk of this mixed flux to the lemel which is to be melted.

Having well mixed together the lemel and the fluxes, the lot is put into a clay crucible, which must be large enough to allow the mixture to boil without overflowing, and, after standing by the side of the furnace until well warmed, put into the fire and carefully melted. The temperature is gradually raised until the whole mass is thoroughly melted, additional flux being added if the slag remains thick and pasty. All ebullition having ceased, the temperature is raised still higher, in order to get the slag as thin as possible, and so allow the metal to sink readily to the bottom, when the contents of the crucible can be poured steadily into an open iron mold, or the crucible can be taken out of the furnace and placed on the floor to cool, in which case the gold will be found as a solid lump, at the bottom, on breaking the crucible.

Lemel is sometimes melted in a plumbago crucible, but in this case it is not advisable to add much niter or soda carbonate as a flux, but to use only borax, with the possible addition of a little niter during the melting, and the gold is always poured out into a mold, as the crucibles are too expensive to be broken after only being used for a single melt. In either case, it is usually preferable that the bar or lump of gold, after removing as much as possible of the adhering slag, should be remelted in another crucible, and well stirred before being cast, in order to insure thorough mixing of its constituent metals. Should it be intended to make the lemel bar up again into jewelry, the fluxes used in the melting must be mainly of an oxidizing nature, such as niter, in order to remove a large proportion of the base metals. Some jewelers, before adding any flux, boil their lemel of high quality in nitric acid, in order to remove any accidental additions of base metal, such as bits of copper, lead, etc., and in some cases this process is very beneficial. After such treatment, the lemel must be mixed with the flux, but a smaller bulk than the amount of lemel will be sufficient, and the melting must be very gradual, on account of the violent ebullition which takes place, for which reason it is also necessary to use a somewhat larger crucible.

The resulting gold should be cleaned and re-melted, well mixed, and poured into an ingot. When cool, a piece of the bar should be cut off and sent to be assayed, when the gold can be alloyed, according to the assayer's report, into the quality which is required. When sending assays of any kind, whether of scrap bars or lemel bars, jewelers should always be careful to send a piece of gold cut off the solid bar, and not odd shots or thin edge pieces, as these are not always reliable, but may differ in quality from the bar, either through excessive oxidation of their proportionately larger surface, or from possible contamination with stray bits of metal. The gold left from melting lemel with oxidizing fluxes is usually soft and ductile, containing principally gold and silver if lemel of high quality only is used, and a reduced proportion of base metal when the lemel is of various standards, but lemel of entirely low quality can rarely be used with satisfactory results. It is really questionable whether it is more profitable to the jeweler to sell his lemel bars to a refiner or to make them up into goods again; in fact some of the largest manufacturers invariably sell their lemel bars, and buy new gold for making up, while others consider it pays to use their lemel over and over again.

Sweep and polishings are very rarely treated by the jeweler, and it undoubtedly is advantageous to dispose of these to a refiner. A few jewelers still prefer to melt their own polishings and sell the bar of gold thus obtained, but it may be pointed out that the refiner, in making his assays of such material, obtains a more exact estimate of the contents of the polishings than it is possible for the jeweler to do, and hence a higher return is obtainable without the trouble and expense of melting the polishings.

PLATINUM, PLATINUM ALLOY, ETC.

During the last few years platinum and platinum (or dental) alloy have been largely adopted as settings for gems, particularly for diamonds. Platinum is a white

metal, not as white as silver, but more like steel in color. It is a very heavy metal, having a density of 21.5, as compared with 19.3, the density of pure gold, while it only melts at a temperature of about 1720 degs. Cent., that is, 653 degs. Cent. above the melting point of gold. It is malleable and ductile, so is easily worked, and does not tarnish on exposure to air, which renders it an excellent mounting for white gems. It is much more costly than gold, and the proposed limitation of the output from Russia will probably result in an advance beyond the present high price, Russia being the main source of supply. During the last 20 years the price has more than quadrupled, the demand for electrical and other purposes, in addition to jewelry manufacture, having increased at a much greater rate than the supply.

The cost of extracting the metal from its ores is high, and, to melt it finally and cast it into bars, special furnaces are required, the ordinary melting furnaces being quite useless. The furnaces suitable are of two types, in one of which the heat is obtained by the oxyhydrogen blow pipe, while the other and more modern type is an electrical furnace.

The heavy expenses connected with the recovery and re-melting of scrap, etc., resulting from its use in making jewelry very considerably add to the cost of the articles, but large quantities are now used for the best qualities of diamond pendants, as settings in gold rings, and also in making chains, in some of which a few links of platinum are alternated with a similar number of gold links.

Dental alloy or platinum alloy is an alloy of platinum and silver, containing 33⅓ per cent. of the former metal. This is very much lower in price than pure platinum, is almost the same color, and is only very slightly tarnished on long exposure to the air, consequently many jewelers have introduced it into goods for which the highest prices are not obtainable, but which it is desired should have a white metal setting superior to silver.

Its physical properties resemble those of platinum in some respects, but it is less malleable and ductile. Its melting point is much lower than that of platinum, in fact it can be melted in an ordinary furnace. Its manufacture is difficult, as the material often requires melting two or three times before a satisfactory bar is obtained, and even then the bar is rarely homogeneous, assays indicating slight variations in composition in different parts of the bar. With alloys of platinum and silver there is almost always some irregularity of this kind, except when the silver is very largely in excess, while if gold also is present, the variations are more pronounced, particularly in the relative proportions of gold and platinum. Alloys of platinum and silver containing less than one-third platinum can be, and are, made, but these are not recommended for jewelry manufacture, while the alloys containing a higher proportion of platinum are unworkable.

In the manufacture of articles in which platinum or its alloy are used, the lemel and scrap from these two materials should be, as far as possible, kept apart from the gold lemel and scrap, as they can then be more easily valued either for sale to a refiner or as credit against new material. This, however, is not always possible, and the jeweler may have a certain amount of lemel which contains gold, silver and platinum, and which he will find considerable difficulty in melting, particularly if the proportion of platinum be at all large. In most cases, it is best to leave this operation to a refiner, whose furnaces are often better adapted to this class of melting, and who is more familiar with the special treatment required by such material, and hence is more likely to produce a bar of regular composition. The assay of these mixed bars is a complicated operation, and requires much longer time to complete than the ordinary assay of gold and silver bars, while the refining is decidedly more costly than is that of ordinary jewelers' products, all of which expenses add materially to the cost of the goods.

COMPARISON OF THE FOUR STYLES OF ROCKWELL OIL AND GAS MELTING FURNACES.

Following is a table giving comparative data from practical tests made of the four styles of furnaces manufactured by the Rockwell Furnace Company, New York.

Data Obtained from Practical Tests.

Type	Crucible Lift Out.	Crucible Tilting.	Simplex.	Double Chamber.
Fuel used	Oil or Gas.	Oil or Gas.	Oil or Gas.	Oil or Gas.
Air pressure	12 ozs. See Note "A."	12 ozs. See Note "A."	12 ozs. See Note "A."	12 ozs. See Note "A."
Fuel consumption per 100 lbs. metal melted—				
Gas (Natural)	250 to 400 ft. See Note "B."	225 to 325 ft. See Note "B."	200 to 300 ft. See Note "B."	186 to 280 ft. See Note "B."
Gas (City)	350 to 500 ft. See Note "B."	320 to 450 ft. See Note "B."	290 to 425 ft. See Note "B."	267 to 400 ft. See Note "B."
Oil Fuel	1¾ to 3 gals. See Note "B."	1¾ to 2½ gals. See Note "B."	1½ to 2 gals. See Note "B."	1¼ to 1¾ gals. See Note "B."
Size	No. 21—50 Cruc.	No. 10—60 Cruc.	No. 92—8 heats.	No. 1—12 heats.
Capacity per hour	133½ lbs.	180 lbs.	445 lbs.	330 lbs.
Size	No. 22—80 Cruc.	No. 11—125 Cruc.	No. 93—7 heats.	No. 2—10 heats.
Capacity per hour	188 lbs.	291½ lbs.	778 lbs.	550 lbs.
Size	No. 23—150 Cruc.	No. 12—275 Cruc.	No. 94—6 heats.	No. 3—10 heats.
Capacity per hour	300 lbs.	458½ lbs.	1,330 lbs.	1,100 lbs.
Size	No. 24—225 Cruc.	No. 13—400 Cruc.	No. 95—5 heats.	No. 4—8 heats.
Capacity per hour	365 lbs.	534 lbs.	2,220 lbs.	1,770 lbs.
Size	.....	.....	No. 96—4 heats.	.....
Capacity per hour	.....	.....	2,667 lbs.	.....

Note "A."—All of these furnaces are operated with a fan blast of 12 ozs. or more, and can be used with any low pressure system where this pressure is available.

Note "B."—The fuel consumed per 100 lbs. of metal melted will vary according to the kind and quality of metal melted, the heat at which it is required, the skill and attention given the furnace by the operator, and the promptness in charging and pouring. The above figures cover ordinary brass and bronze mixtures.

THE MANUFACTURE OF WROUGHT BRASS

A Description of Modern Methods for the Production of Plate, Sheet, Rod, Wire and Tube.

(Continued from November.)

By L. J. Krom.

COILING THE BRASS.

There are a number of machines in use for the coiling or winding of the strip of brass as it passes from the rolls. A type of machine devised for this purpose is shown in Fig. 12. This machine is the invention of John Tyler and Francis Higgins, superintendent and master mechanic respectively of the Michigan Copper & Brass Company, Detroit, Mich The coiler can be adapted to any roll, run at any speed, and is used for any size and width of metal. It is used for finished metal and works automatically in so far as it winds one coil while another is being removed from the machine. It will be seen that the machine consists of two rolls or blocks mounted on a double arm pivoted in the center. By this means one block is swung over near the rolls, and the other is free to allow of withdrawing the wound coil. The motive power is supplied by a belt not shown in the picture.

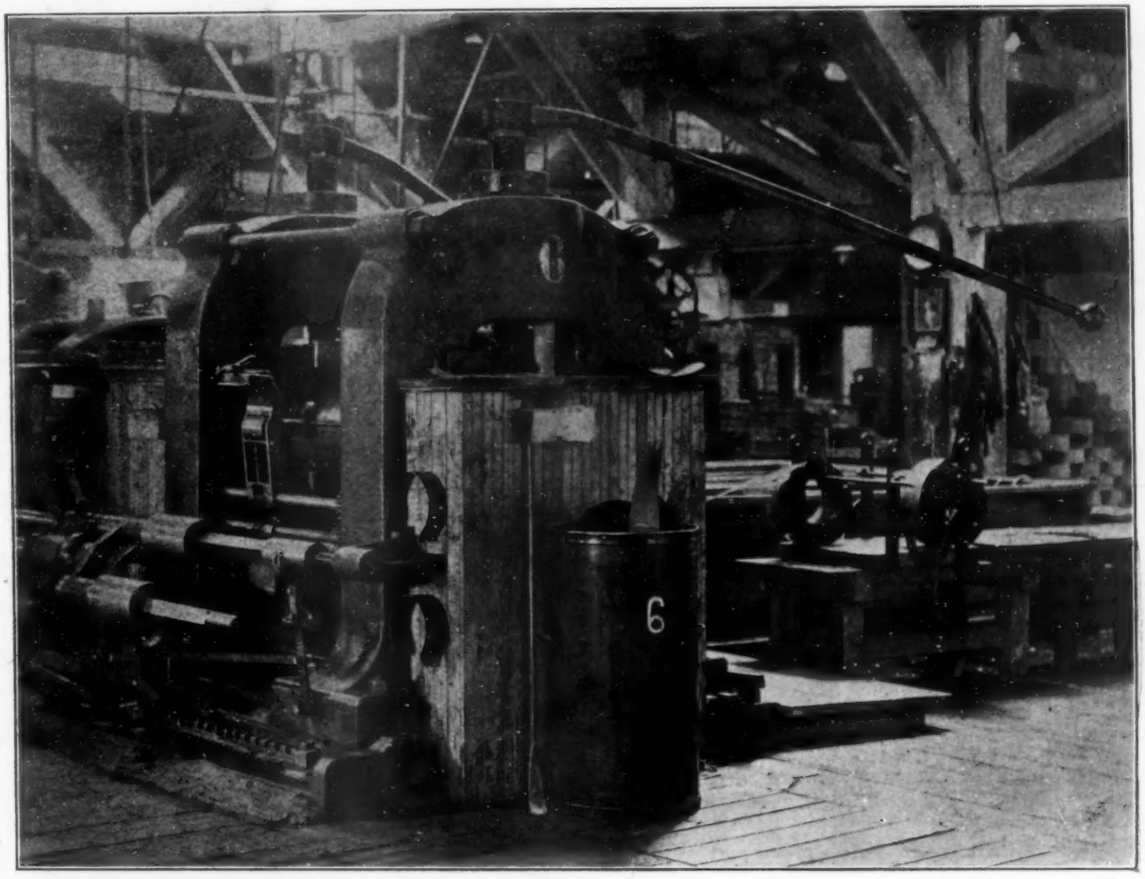


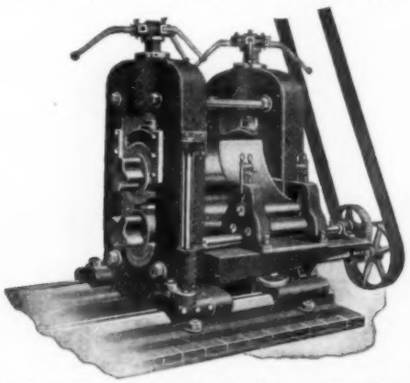
FIG 12. SHEET METAL WINDER FOR FINISHED METAL.

Another coiler invented and patented by A. P. Hine, general superintendent of the American Brass Company, Waterbury, Conn., is shown in Fig 13 This coiler is known as the Hine coiler for sheet metal. The machine can be used for coiling sheet metal or rod as the material issues from the rolls of a cold rolling mill. As is well known, the principal advantages of a coiler are: Coils are easier to handle than straight strips, the metal is in better shape for annealing and finishing, floor space is saved, and output is increased.

The coiler is made in a number of sizes, and either right or left handed, as may be desired; the machine shown in Fig. 13 is right handed. The machine has three rolls, the upper roll being adjustable vertically so as to coil to the desired size different thicknesses of metal. Each of the screws by which this adjustment is obtained is indexed to allow of the setting of the upper roll parallel to the lower rolls. The rolls are crucible steel, the necks turning in phosphor bronze bushings in the housings. These roll housings are fastened to a bedplate, which can be moved sideways on the coiler table, so as to permit different parts of the face of the mill rolls to be used in turn. The table is pivoted to one of the mill roll housings, and the coiler can be swung around out of the way if necessary. The coiler rolls are driven by a belt from any source of power. Guides are furnished for leading the metal from the mill to the coiler rolls, and a shield supports the coil while it is forming. This form of coiler is used on all widths of metal up to, say, No. 15.

ROLLING THE METAL.

In the rolling process, as remarked before, much depends upon the character of the metal, its mixture, quality and width, and also the judgment and experience of the roller in charge. Most all metal is cast the same thickness, 1⅛ or possibly 1¼, and the various reductions are gauged accordingly. Some random "pinches" or reductions taken from a note book show the following:



HINE COILER FOR SHEET AND ROD. MANUFACTURED BY WATERBURY FARREL FOUNDRY AND MACHINE COMPANY, WATERBURY, CONN.

Suppose the bars are common drawing, spinning, low brass or bronze, and that we start with them at No. 15 gauge or .057 in., then the order to the roller reads: All 5-in. metal to finish at No. 36, or .005 in., will be rolled from No. 15 to 22, or .025-in., in two passes through the rolls, and then sent to the fire and annealed. The metal after annealing and pickling is then to be rolled from No. 22 to No. 27, or .014 in., in two passes and again annealed, and so on. In general it will be seen that the reductions are from 5 to 6 numbers between each annealing. This rule, if it can be called so, is for narrow widths, say, up to 10½ ins. wide, and for the "straight" mixtures. Those bars that are wider up to 18 ins., and also of leaded and other special mixtures have no set rules, but the rolling must be governed entirely by local conditions.

Continuing from the note we find:

5	inch	metal	to	finish	at	.006	inch	roll	to	number	22	in	2	passes.
"	"	"	"	"	"	.013	"	"	"	"	21	"	2	"
"	"	"	"	"	"	.010	"	"	"	"	22	"	2	"

The above applies to all width metal from 5 to 8 ins.

Also:

5	to	8	in.	metal	to	finish	at	.015	ins.	roll	to	21	in 2	passes.
"	"	"	"	"	"	"	"	.016	"	"	"	21	" 2	"
"	"	"	"	"	"	"	"	.017	"	"	"	21	" 2	"
"	"	"	"	"	"	"	"	.018	"	"	"	20	" 2	"
"	"	"	"	"	"	"	"	.020	"	"	"	19	" 1	pass.
5½	"	"	"	"	"	"	"	.021	"	"	"	19	" 1	"
"	"	"	"	"	"	"	"	.025	"	"	"	17	" 1	"
8½	"	10½	"	"	"	"	"	.010	"	"	"	19	" 2	passes.
"	"	"	"	"	"	"	"	.012	"	"	"	19	" 2	"
9			"	"	"	"	"	.017	"	"	"	18	" 2	"
9½			"	"	"	"	"	.013	"	"	"	19	" 2	"
11½			"	"	"	"	"	.028	"	"	"	17	" 1	"
12½			"	"	"	"	"	.035	"	"	"	14	" 2	"

All 10½ to 12½-in. metal except leaded roll from 1⅛ to ¾ ins. in 4 passes. Roll then from ¾ in. to No. 1, or .289 in. in 4 passes, and from ½ in. to No. 1, or .289 in. in 4 passes.

All leaded metal up to 14½ ins. is to be rolled as follows

From	1⅛	inches	to	⅞	inch	in	2	passes.
"	⅞	"	"	5/8	"	"	"	"
"	5/8	"	"	7/16	"	"	"	"
"	7/16	"	"	5/16	"	"	"	"

(To be Continued.)

BRONZE MONUMENT TO GENERAL VON STEUBEN.

The fifty-seventh Congress passed a bill, introduced by the Honorable Richard Bartholdt, of Missouri, to erect in the City of Washington a monument to Baron Frederich Wilhelm von Steuben, appropriating $50,000 therefor, and creating a Steuben Monument Commission. This commission, advised by the late Augustus St. Gaudens, invited in competition a number of well known sculptors to submit sketch models. Of these, the one designed by Albert Jaegers was accepted by the commission, upon the recommendation of Mr. St. Gaudens. This monument was unveiled in Washington, December 7 by Miss Helen Taft, daughter of President Taft.

BARON FREDERICK WILHELM VON STEUBEN.

The statue, as shown in the picture, stands eleven feet from the spurred boots to the cocked hat. The German officer is represented as a General of Cavalry in Continental uniform. The form is half enveloped in a voluminous military cloak, which hides both hands, one of which rests upon the concealed hilt of his sword. The Order of Knighthood, conferred upon him by Frederick the Great, hangs upon his breast, and the military coat is unbuttoned and thrown back. A gallant figure, the Baron in bronze, dressed rather for parade than for battle. His peruque, carefully arranged, shows the dandy, but his cocked hat, set squarely atop his head, indicates something of the man to whom war was a business and not an opportunity for displaying finery.

THE OPPORTUNITIES OF A METALLURGICAL CHEMIST.

How He Can Become an Important Factor in the Metal Industry.

By Christophe E. Ott.*

Although the day when all foundry work was carried on by "rule of thumb" is over, there are many foundries today that do not employ a chemist, and, if you were to ask why they did not have one, they would invariably reply that they did not need one. Now, the statement that a chemist is not needed in a foundry is not true, for the simple reason that there are times when heats go wrong, no matter how careful and watchful the melter may be, and a batch of metal is consigned to the scrap heap when an analysis of it would instantly show where the trouble lay and a means for remedying the same so that the metal could all be saved.

The real reason why the foundry has no chemist is that the amount of work done would not be sufficient to warrant the expense connected with the equipment and maintenance of a chemical laboratory, and it is to meet the requirements of small concerns where that is the case, that we have in all our large cities well equipped laboratories that look after the chemical work of several of these industries.

WHAT THE CHEMIST SHOULD KNOW.

In order to be of most use to any foundry the chemist connected with it must be in absolute control of the weighing, mixing and melting, for the slightest variations in weight often lead to faulty castings and other gross errors. He must have an accurate knowledge of the alloying properties of the different metals and be able to produce alloys for any desired purpose. He must know what impurities are allowed and the percentages, and he must know a way to eliminate these impurities if such a thing is possible.

Fluxes he must be acquainted with, their melting points and other physical properties. It might not be amiss at this point to name a few of the more important fluxes and state their general properties.

VARIOUS KINDS OF FLUXES.

A flux, according to our latest chemical dictionaries, is any substance or mixture used to assist the fusion of mineral substances. This assistance may be brought about in different ways, e. g., the flux may act by combining chemically with some part of the substance under treatment, thus breaking up a compound that could not easily be separated into its constituents. To illustrate we can take the metallurgy of copper. Where low grade sulphide ores are used in the blast furnace, iron pyrites (sulphide of iron) is used as the flux; this furnishes the sulphur to combine with the copper of the ore to make the copper matte, and the iron combines with the silica in the ore, forming a slag.

The flux may also act by keeping the fire gases away from a metal or alloy and thus prevent oxidation, or, in some cases, absorption of gases; this is the principal use to which the flux is put in the foundry.

Of the fluxes in use may be mentioned the following: Borax, glass, lime, fluorspar, soda ash, cryolite and salt. Of these, borax is by far the most valuable on account of its power to form highly fluid combinations when fused with silica and most metallic oxides. As ordinary borax contains about 47 per cent. of water, it has to be melted and the water driven off by heat. The result of the fusion is known as borax glass. As borax is somewhat expensive when used alone, it may be used mixed with an equal amount of powdered glass. Although of high melting point, window or plate glass free from lead but high in lime, is to be preferred.

Lime is used in large metallurgical operations as the flux for silica, clay, etc., as, for instance, in the blast furnace in the smelting of iron ore, lead ores, etc. The source of the lime is limestone and should be as pure as possible.

Fluorspar is used as a flux for sulphates, silicates, etc., forming a very fusible slag.

Soda ash is a powerful desulphurizer; it also forms the most fusible slag with silicates.

Common salt is used very extensively to prevent access of air to a melt, and can be used either alone or mixed with other fluxes.

Cryolite is a valuable flux for aluminum because it has the property of dissolving large portions of alumina in it.

In soldering, anything that will dissolve away the oxides of the metals to be soldered, leaving clean surfaces, may be considered as a good flux. Zinc chloride is probably used in more soldering fluxes than any other substance, as it has an exceedingly low melting point and is an excellent cleaner of most metal surfaces—both points of advantage in soldering.

Silica sand is used by all blacksmiths as a flux in welding, as it combines with the iron scale, leaving two bright surfaces for the weld. I might go on almost indefinitely in this manner, as for almost every metallurgical operation—be it large or small—a flux of some nature is needed to separate the impurities from the metal.

IMPORTANCE OF TEMPERATURE.

In any melting operation it is essential not to overheat the metal, and it is the chemist's duty to determine accurately, by means of a pyrometer—of which there are many reliable makes on the market—the temperature best suited for the pouring of the melt, and then to make charts giving the weights of the various metals in an alloy and the temperature at which it should be poured. Overheating entails a loss in two ways—loss of fuel and loss of metal due to oxidation—and relying on the eye for the determination of temperature is very poor practice. I give here in degrees Fahrenheit the melting points of several of the more important non-ferrous metals:

Copper	2,008 degs.	Tin	450 degs.
Manganese	2,204 degs.	Antimony	1,166 degs.
Nickel	2,615 degs.	Bismuth	516 degs.
Aluminum	1,215 degs.	Gold	1,940 degs.
Zinc	786 degs.	Silver	1,762 degs.
Lead	620 degs.	Platinum	3,187 degs.

It is needless to state the well-known law that alloys melt at a lower temperature than their constituents.

*Metallurgical Chemist, Marquette, Mich.

Imports of platinum into the United States for the first eight months of this year aggregate 77,637 ounces, valued at $2,057,446.

THE HEAT-TREATMENT OF BRASS.*

Experiments on 70:30 Alloy.

By G. D. Bengough, M. A., and O. F. Hudson, M. Sc.

Objects.

The objects of the present investigation were:—

1. To study the effects of heat-treatment on rolled and drawn 70:30 brass or varying size of section and of somewhat varying character, as made by different manufacturers.

2. To throw some light on the question of "burning." For the purposes of the present paper a sample of brass is considered to be burnt, when its ductility, as measured by the percentage elongation, has been lowered by heat-treatment.

Historical.

The most important researches on similar subjects have been carried out by Charpy, Grard, and Cubillo. Charpy's † work, which consisted of an investigation into the constitution, structure, and properties of alloys of copper and zinc, including a number of experiments on the effect of annealing on 70:30 brass. His results are given in Table I., and may be compared with those ob-

Table I. (a).—70:30 Brass.*

Annealing Temperature. Degs. Cent.	Maximum Stress. Tons per Sq. In.
0	31.4
200	32.5
280	29.5
420	21.6
500	21.6
560	19.0
600	17.4
650	17.4
730	18.6
780	18.2
800	18.2
850	18.2

*Charpy's results.

Table I. (b).—70:30 Brass, with 0.15 per cent. tin and 0.2 per cent. lead.*

Annealing Temperature. Degs. Cent.	Maximum Stress. Tons per Sq. In.	Elongation. Per Cent.
0	39.4	3.8
540	20.3	55.0
585	20.1	57.3
620	19.0	60.8
700	18.6	64.8
730	19.0	62.0
860	17.5	57.0
930	16.8	56.5

*Charpy's results.

tained by the authors. His conclusions on the question of burning were as follows:— (1) 70:30 brass made from pure copper and pure zinc was not burnt after annealing at 900 degs. Cent. (2) Ordinary 70:30 brass (0.15 per cent. tin and 0.2 per cent. lead) is burnt by heating to 800 degs. Cent. His results, however, were not very definite, and he only examined the question from the point of view of temperature. The authors, on the other hand, have endeavored to ascertain by what means the temperature has effected the deterioration in properties—whether by volatilization of zinc, by excessive crystalline growth, or by mere loss of cohesion between the molecules at high temperatures, in which case permanent deterioration may result from careless handling. The influence of time has also been taken into account.

Grard's ‡ experiments were mainly directed to ascertaining in a quantitative manner the effect of work on *a*-brass, and the exact temperature at which that effect was removed. With a constant annealing time of fifty minutes (using testing bars of 52 sq. mm. and 60 sq. mm. in cross section) the elastic limit was found to fall off very slightly up to 200 degs. Cent., then more rapidly to 300 degs. Cent., and beyond that temperature more slowly to 825 degs. Cent., when it was very small. The breaking load was practically unaffected below 275 degs. Cent., but between 275 degs. Cent. and 300 degs. Cent. it fell off rapidly, and then more slowly to 900 degs. Cent. No effect was produced on the ductility as measured by elongation by annealing temperatures up to 250 degs. Cent. From 250 degs. Cent. to 300 degs. Cent. there was a rapid increase in the elongation, and from that temperature a regular increase up to 285 degs. Cent., after which the elongation decreased as the annealing temperature became higher. Grard also investigated the effect of varying time of annealing for the lower temperatures, and found that at 300 degs. Cent. one hour was required to produce any noticeable change in the strength or ductility, while at 400 degs. Cent. annealing for ten minutes was sufficient to produce a marked effect. For temperatures above about 500 degs. Cent. to about 650 degs. Cent. annealing for more than one hour had little further effect on the strength or ductility. Grard also examined the microstructures of the annealed bars, but his work throws little new light on the question of burning.

Cubillo ¶ sets forth his experience as a manufacturer of brass for cartridge and other purposes, but gave no details of experimental results. His paper deals with effect rather than cause.

Material Used in the Present Research.

A ¾-inch round bar of ordinary high-grade 70:30 brass was supplied in the hard-rolled condition by a well-known firm. This bar was cut into test pieces, lettered G, and may be taken as representing the ordinary 70:30 brass of commerce. Its analysis was as follows:

	Per Cent.
Copper	71.0
Tin	0.02
Lead	0.25
Iron	0.2

To compare this, another bar of ¾-inch round hard-rolled 70:30 brass was supplied by another firm. This bar was cut into test-pieces, lettered HB. Its analysis was as follows:

	Per Cent.
Copper	69.4
Tin	trace
Lead	0.005
Iron	0.15

It will be noticed that this alloy is of unusual purity. The same firm also supplied to the authors a third bar, B, of similar material, having the following analysis:

*From a paper read at Glasgow meeting, Institute of Metals, Sept. 21-23, 1910.

†Bulletin de la Société d' Encouragement l'Etude des Alliages, p. 1.

‡Revue de Métallurgie, 1909: Mémoires, p. 1069.

¶Engineering, October 27, 1905.

	Per Cent.
Copper	69.7
Tin	trace
Lead	trace
Iron	0.2

This bar was 1-inch round, and was in a softer state than the others. It was mainly used for some experiments on the effect of prolonged annealing at high and other temperatures.

All the material was such as is supplied by the manufacturers in the ordinary way of business to their customers.

Scheme of Work.

The bars as received from the makers were cut to 9-inch lengths, turned into test-bars, and heated in electrically-heated tube furnaces, the temperatures of which were ascertained and controlled by thermo-electric pyrometers. After annealing, the bars were withdrawn at a dull red heat, cooled in air, and tested in the ordinary way. Before testing, a piece was cut from each test-bar for microscopic examination. With a view to ascertaining the influence of size of section, a hard-drawn ⅛-inch diameter wire of brass similar to bar G was annealed at the same time as the test-bars. Test-pieces of this wire were also heated in an electric resistance furnace to temperatures between 300 degs. Cent. and 600 degs. Cent., and tested while at these temperatures. Various subsidiary sets of experiments were also made, particularly on the question of "burnt brass."

Table II.—Mechanical Tests of Bars HB

Mark.	Treatment, Time, and Temperature of Annealing.	Yield Point, Tons per Sq. In.	Maximum Stress, Tons per Sq. In.	Elongation, per Cent. on 2 In.	Contraction of Area Per Cent.	Surface of Bar after Test.
HB	As rolled	31.5	31.7	19.0	65.0	Smooth
HB14	½ hour, 320° C.	27.4	32.9	19.5	65.5	"
HB10	½ hour, 405° C.	11.3	25.1	55.0	75.5	"
HB1	½ hour, 500° C.	12.4	23.2	†41.0	72.0	"
HB2	½ hour, 570° C.	9.6	23.4	60.0	77.0	"
HB3	½ hour, 630° C.	6.5	21.0	65.0	75.0	"
HB12	½ hour, 657° C.	5.3	20.95	68.0	81.0	"
HB4	½ hour, 660° C.	6.4	20.5	76.5	80.0	"
HB5	½ hour, 680° C.	5.4	20.2	70.0	77.0	Very slightly roughened.
HB6	½ hour, 702° C.	5.1	20.0	76.0	77.0	"
HB11	½ hour, 754° C.	4.8	20.3	72.0	80.0	Slightly roughened.
HB7	½ hour, 765° C.	4.1	19.8	79.0	70.0	"
HB8	½ hour, 808° C.	3.4	18.4	81.0	75.0	Roughened.
HB13	½ hour, 847° C.	4.0	18.8	77.0	73.0	"
HB9	½ hour, 900° C.	3.3	17.7	83.5	70.0	"

†Broke outside gauge marks.

Table III.—Mechanical Tests, Bars G, Half-hour Annealing.

Mark.	Treatment, Time, and Temperature of Annealing.	Yield Point, Tons per Sq. In.	Maximum Stress, Tons per Sq. In.	Elongation, Per Cent. on 2 In.	Contraction, Per Area Per Cent.	Surface of Bar after Test.
G	As rolled.	21.5	25.0	35.0	65.0	Smooth.
G15	½ hour, 285° C.	20.9	25.6	35.0	66.0	"
G16	½ hour, 350° C.	18.4	25.2	38.5	53.0	Slightly roughened.
G17	½ hour, 400° C.	16.3	24.6	46.0	53.5	Smooth.
G18	½ hour, 500° C.	5.8	20.9	67.5	74.5	Slightly roughened.
G21	½ hour, 725° C.	4.3	18.5	80.0	75.0	Roughened.
G26	½ hour, 920°-925° C.	3.7	18.2	78.0	63.0	Cracked.

Table IV.—Mechanical Tests of Wires.

Mark.	Treatment, Time, and Temperature of Annealing.	Yield Point, Tons per Sq. In.	Maximum Stress, Tons per Sq. In.	Elongation, per Cent. on 2 In.
Wo	As drawn	23.1	25.3	15.5
Wo	As drawn	22.5	25.0	19.0
W15	½ hour, 285° C.	22.5	28.5	20.0
W14	½ hour, 320° C.	19.9	25.3	25.0
W16	½ hour, 350° C.	18.2	26.2	30.5
W10	½ hour, 405° C.	8.5	20.7	45.0
W8	½ hour, 500° C.	5.2	18.1	54.0
W9	½ hour, 570° C.	6.6	18.4	55.0
W4	½ hour, 630° C.	4.3	17.1	58.0
W12	½ hour, 657° C.	2.8	16.4	55.0
W1	½ hour, 660° C.	3.8	16.7	*53.0
W7	½ hour, 680° C.	3.2	16.5	58.0
W3	½ hour, 702° C.	3.1	16.4	63.0
W11	½ hour, 754° C.	3.8	15.8	63.0
W2	½ hour, 765° C.	1.9	14.7	61.0
W6	½ hour, 808° C.	3.1	15.3	59.0
W13	½ hour, 847° C.	3.8	15.5	59.0
W5	½ hour, 900° C.	4.1	14.3	53.0
W26	½ hour, 925° C.	?	12.9	25.0
W25	2 hours, 910° C.	...	10.5	18.0

*This bar showed signs of melting.

Effect of Annealing Temperature.

The results of the ordinary tensile tests on bars and wires annealed for half-an-hour are given in Tables II. to IV. From these results the following facts are evident:

Maximum Stress.

1. In all cases the maximum stress increases with rise in annealing temperature up to about 300 degs. Cent. It then falls off rapidly to 500 degs. Cent. The HB bar evidently had received more work than the G bar or the wire, and, in consequence, there is much greater numerical loss of strength between these temperatures. Nevertheless, for temperatures between 500 degs. Cent. and 800 degs. Cent., the strength of the HB test-bars is in all cases superior to that of the G bars, though the superiority gradually diminishes as the temperature rises, and has disappeared at 850 degs. Cent. As regards the wire, the strength falls off uniformly from 500 degs. Cent. to 900 degs. Cent., and is, for all temperatures, less than that even of the G bars, the difference increasing as the temperature rises. It will be seen later that prolonging the time of annealing has the effect of lowering the strength of a bar; it would also seem from the above that decreasing the section has a similar effect. The corollary at first sight would seem to be to proportion the time of annealing to the section of the bar, and so to avoid burning thick sections by annealing at higher temperatures. It will be seen later, however, that time is at least as important a factor in burning as temperature. It does not seem, therefore, that any decided advantage can be claimed for the method suggested over the rival one of proportioning the temperature to the section. As a matter of fact, both plans are used in works, some managers favoring one, and some the other.

Yield Point.

2. The yield points given in these tables are the stresses required to give the first noticeable elongation, but, except in the case of the bars as hard-rolled, and in a few other cases, the yield point is not very sharply defined.

Elastic Limit.

3. It was thought that it would be interesting to make a determination of the true elastic limit in the case of one of the alloys used, and to ascertain whether any definite load existed which could be strictly regarded as a sharply

defined yield point; also, if it existed, what relation this had to the elastic limit. This determination was made on the B alloy, using a bar with screwed ends, 16 inches long and 12 inches between shoulders. The elastic limit is at 8.35 tons per square inch. The yield point cannot be strictly defined, but the extension which occurs at 12.5 tons would probably be the first which would be easily recognized in ordinary testing. It was thought that it would be interesting to make a few experiments as to the effects of a period of rest, and of very low annealing temperatures on the elastic limit. The results obtained are shown in Table V. It will be seen (1) that

TABLE V.—Determination of Elatsic Limit, Bar B. Diameter of Test-Piece, 0.781 Inch.

No. of Loading.	Treatment.	Elastic Limit, Tons per Sq. In.	Yield Point, Tons per Sq. In.
1	As rolled	8.35	12.5
2	.....	8.35	14.0
3	12 days after No. 2	8.35	15.2
4	1 hour, at 90° C.	8.35	15.4
5	1 hour, at 210° C.	5.0	7.0

a prolonged period of rest raises the yield point; (2) that annealing for 1 hour at 90 degs. Cent. has no effect whatever; and (3) that annealing for 1 hour at 210 degs. Cent. has very considerably lowered both elastic limit and yield point.

ELONGATION.

4. In all cases the elongation is not much affected until an annealing temperature of 300 degs. Cent. is passed. Just above this temperature a very rapid increase occurs in the case of the wires. In the case of the bars the rapid increase sets in at about 350-400 degs. Cent. Here again an increase in size of section seems to require a longer time of annealing to produce similar results. The maximum elongation is reached with an annealing temperature of 750 degs. Cent. for the wires, and with approximately the same temperature for the bars G. In both these cases a diminution seems to occur with annealing temperatures above 800 degs. Cent. For the HB bars, on the other hand, the elongation appears to increase regularly up to a temperature of 900 degs. Cent.

INFLUENCE OF TIME IN ANNEALING.

The above remarks apply only to bars annealed for half-an-hour. The tests given in Table IX. were made for the purpose of comparison with the tests referred to.

In the case of bars B, *i. e.*, of the brass free from tin and lead, annealing for one week at 440 degs. or seven hours at 665 degs. Cent. has practically no effect. Annealing for twenty-four hours at 750 degs. Cent. causes a lowering of the maximum stress, but the elongation of 81 per cent. on 2 inches indicates that the alloy is not injured by this treatment. Similarly it will be noticed that annealing for twenty-four hours at 810 degs. Cent., although causing a still further lowering of the maximum stress, has not produced any effect that indicates "burning." Bar B9, which was annealed for only six hours at 840-850 degs. Cent., shows a marked lowering of the elongation and contraction of area, and has suffered by this treatment a distinct deterioration. Lastly, an annealing for seven hours at 900-910 degs. Cent. has resulted in a further very noticeable weakening of the material, accompanied by a pronounced loss of ductility. A comparison of the mechanical properties of bars B17 and B9 with those of bars HB9 and HB13, of similar material, annealed for only half-an-hour at 900 degs. Cent., points very clearly to the important effect of time in annealing at very high temperatures. It need hardly, however, be said that such very drastic treatment as bar B17 has received is very unlikely to occur in practice. These experiments, therefore, cannot be claimed to have ascertained the cause of the phenomenon of burning, which is said to occur occasionally even in the best regulated works.

COMPARATIVE EFFECTS OF OXIDIZING AND REDUCING GASES IN THE ANNEALING FURNACE.

It was thought possible that the presence of reducing gases in the annealing furnace might, at unduly high temperatures, cause a reduction of small amounts of oxide or slag contained in the metal, and thus affect its mechanical properties, especially in the case of the G bars, which contained a certain amount of impurities. Accordingly bars G0, G1, G2, G3, G4 were annealed in an atmosphere of coal gas. The results are given in Table VI. It will be seen that annealing for three hours

TABLE VI.—Mechanical Tests, G Bars Annealed in Reducing Temperatures.

Mark.	Treatment, Time, and Temperature of Annealing.	Yield Point, Tons per Sq. In.	Maximum Stress, Tons per Sq. In.	Elongation, Per Cent on 2 In.	Contraction of Area Per Cent.	Surface of Bar after Test.
G0	3 hours, 700° C.	5.9	21.5	68	66	Smooth
G1	3 hours, 825° C.	3.7	18.6	80	70	Slightly roughened.
G4	7 hours, 850° C.	...	17.1	62	...	....
G3	3 hours, 900° C.	3.5	16.8	58	...	....
G2*	2½ hours, 920°-930° C.	3.7	15.3	41	32.7	Badly cracked

at 825 degs. Cent. has in no way injured the alloy, but that seven hours at 850 degs. Cent. has produced a distinct deterioration, as shown by the elongation. Three hours at 900 degs. Cent. has also injured the alloy, and two and one-half hours at 920-930 degs. has altogether ruined it. Comparing these with the similar tests (Table VII.) carried out in an oxidizing atmosphere, it seems

TABLE VII.—Mechanical Tests, Bars G Annealed at High Temperatures in an Oxidizing Atmosphere.

Mark.	Treatment, Time, and Temperature of Annealing.	Yield Point, Tons Per Sq. In.	Maximum Stress, Tons Per Sq. In.	Elongation, Per Cent. on 2 In.	Contraction of Area Per Cent.	Surface of Bar after Test.
G25	2 hours, 920°-925° C.	4.5	18.0	67.0	70.6	Roughened.
G27	1 hour, 910° C.	3.6	17.25	71.0	51.3	Cracked.
G28	3 hours, 910°-920° C.	3.4	16.4	62.5	49.7	Badly cracked.
G29	3 hours, 910°-920° C.	3.0	16.9	64.5	47.0	Cracked.

probable that the presence of reducing gases is at any rate not a predominant factor in the production of burnt brass, since annealing in an oxidizing atmosphere produces very similar effects.

The authors wish to express their acknowledgments to Mr. F. H. Hummel, M. Sc., for his assistance and interest in many of the tensile tests detailed above.

LOSS OF ZINC BY VOLATILIZATION.

It has been suggested * that loss of zinc by volatilization may be one cause of the phenomenon of burning. The following experiments were therefore made to test this: Turnings were taken at various depths from the exterior of certain of the bars after they had been annealed at the higher temperatures, and estimations of the percentage of copper made on each sample taken. The results are recorded in Table VIII. It will be seen that the exterior layers, to a depth of 1-64 inch, showed an

*C. H. Desch, Metallography, p. 387.

increase in the copper (*i. e.*, a loss of zinc) of 1.5 per cent. after being annealed for half-an-hour at 850-900 degs. Cent. The loss of zinc decreases as the distance from the surface increases, and at a depth of about 1-16 inch the loss of zinc by volatilization is almost negligible.

TABLE VIII.—Loss of Zinc by Volatilization.

Bar.	Treatment.	Distance from Surface.	Percentage of Copper.
G2	Annealed for 2½ hours at 920°-930° C. in a reducing atmosphere	0-1/64 in.	76.7
		1/64-1/32 in.	75.3
		1/32-3/64 in.	72.3
		3/64-1/16 in.	71.5
		1/16-5/64 in.	71.2
G27a	Annealed for 1 hour at 930° C. in an oxidizing atmosphere	0-1/64 in.	75.7
		1/64-1/32 in.	74.4
		1/16-3/32 in.	70.6
HB9	Annealed for ½ hour at 900° C.	0-1/64 in.	70.8
		1/64-1/32 in.	70.0
		1/32-3/32 in.	69.7
		3/32-1/64 in.	69.4
HB6	Annealed for ½ hour at 700° C.	0-1/64 in.	69.9
		1/64-1/32 in.	69.7
		1/32-3/64 in.	69.8
		3/64-1/64 in.	69.5

For a bar, such as HB6, which was annealed for half-an-hour at 700 degs. Cent., the loss is small, and amounts to only 0.5 per cent. on the exterior layer of 1-64 inch. For a longer annealing time, and for bars that were known to be distinctly burnt, the loss of zinc was considerably higher, amounting in one case (G2) to 5.5 per cent. It will be seen that this loss is approximately five times that lost by HB9, which was annealed at about the same temperature for half-an-hour. But even in this case the loss of zinc by volatilization almost ceases to be appreciable at a very short distance from the surface of the bar, and consequently the ratio of zinc lost to total zinc originally present must be small. Moreover, the zinc does not appear to be removed by violent evolution, but by gentle diffusion and evaporation from the surface. It seems to the authors probable that the removal of zinc is not a primary cause of burning, but merely an accompaniment of that phenomenon. To a very limited extent it occurs also at ordinary annealing temperatures.

TESTS AT HIGH TEMPERATURES.

It is thought that it would be interesting to carry out a series of tests on one of the alloys at various temperatures, so as to afford a comparison with those of the similar alloys which have been merely annealed at a high temperature and afterwards tested cold.

The method used for carrying out these tests was as follows: A length of wire was clamped at the top end and heated in a vertical electric resistance furnace. From the bottom end of the wire a stirrup was hung on which could be placed a series of standard weights. It was found that the speed of loading had a considerable effect on the maximum stress, especially at the higher temperatures. The figures for this property correspond to the load required to break the wire in from 15 to 20 minutes. It was found that any attempt to mark the test-wires with punch marks, or fine scratches made with a steel or diamond point, localized the fracture, particularly at temperatures above 400 degs. To get over this difficulty fine graphite marks were made on the wires at distances apart of 1 inch; these were used for determining the elongation in the ordinary way. This plan was found to be satisfactory up to a temperature of 500 degs. Cent.. At temperatures in the neighborhood of 600 degs. Cent. some difficulty was experienced in recognizing these marks owing to the large amount of oxidation of the alloy. The figures for the wires tested at 590 degs. Cent. may, however, be said to be reliable, since four results agreeing fairly closely have been obtained. No temperatures higher than 600 degs. Cent. have so far been used in these tests, owing to the difficulty mentioned. The results are given in Table IX.

TABLE IX.—Mechanical Tests—Bars B.

Mark.	Treatment, Time, and Temperature of Annealing.	Maximum Stress, Tons per Sq. In.	Elongation, Per Cent. on 2 Ins.	Contraction of Area Per Cent.	Surface of Bar after Test.
B5	As rolled	22.4	65.0	78	Smooth
B6	"	22.25	57.0	76	"
B3	1 week, 444° C.	22.2	62.5	70	....
B4	1 week, 440° C.	22.6	70.3	72	....
B1	7 hours, 665° C.*	21.85	70.5	77	Smooth
B2	7 hours, 665° C.†	22.25	69.5	76	"
B7	24 hours, 750° C.	19.6	81.0	..	Slightly roughened.
B8	24 hours, 750° C.	19.5	81.0	..	"
B12	½ hour, 860° C.	17.7	87.5	..	Roughened.
B16	24 hours, 810° C.	17.3	85.5	75	"
B9	6 hours, 840°-850° C.	17.3	70.5	68	Cracked.
B17	7 hours, 900°-910° C.	15.6	†50.5	54	Badly cracked.

*Yield point 7 tons per square inch.
†Broke outside gauge marks.

MICROSCOPIC WORK.

The microstructure of the bars after annealing and before testing was examined, and typical structures are illustrated by photographs reproduced in Plates I. to III. The general effect of annealing on the crystalline structure of 70:30 brass is now a matter of common knowledge, but there are one or two points that may perhaps be noted here with advantage.

1. Annealed Structures.—The first effect of annealing on a rolled or otherwise strained sample of brass is to bring any altered and crushed material into a condition suitable for subsequent recrystallization. As the temperature rises, recrystallization sets in from a large number of new centres, the result being that after annealing for half-an-hour at 500 degs. Cent. the structure appears very distinctly finer than in the original bar as rolled. From this point crystal growth proceeds rapidly.

2. Over-Annealed Structures.—The result of annealing at an unduly high temperature is a very rapid crystalline growth, which causes the coarse structure characteristic of over-annealed brass. After a certain time this very rapid growth of crystals probably slows down, and the size of crystals approaches a maximum value.* Possibly there is a definite size of crystal characteristic of each temperature, which is not affected by time once equilibrium has been reached.

3. The Microstructure of Burnt Brass.—As far as the authors have been able to ascertain, the structure of burnt brass, in the case of the material used for this work, closely resembles over-annealed brass, with a possible difference that the lead segregates in the crystal boundaries. They have found no sign of the pitted structure, which is generally said to be characteristic of burnt brass, except with very deep etching.

4. Effect of Lead.—The presence of lead is indicated by small, more or less rounded, particles scattered through the crystals. When the brass containing lead has been annealed at a very high temperature, there is a tendency for the lead to segregate between the crystals, and this effect seems to increase with the time of annealing.

*Reference may be made here to the work of Ewing and Rosenhain on crystal growth after annealing, Metallographist, 1902, p. 81.

A REVOLUTION IN THE ART OF MOLDING.

PRESENT IMPROVEMENTS IN THE MANUFACTURE OF ALUMINUM MATCH PLATES.

Some ten years ago the first aluminum matchplate of record was put in operation in San Francisco, California, by the Pacific Stamping Company. This was a bench plate of four legs, for an air-tight stove and was made by Herbert Matthews, then foundry foreman of the Occidental Stove & Foundry Company, of San Francisco. The plate was a success in every way, but the excessive price of aluminum in those days made the cost of matchplates of that material prohibitive. Then, too, no suitable alloy for aluminum had been discovered and it was feared that large plates made of the pure metal would not hold their shapes. For these reasons, the use of aluminum was discontinued until the price was lowered and the art of alloying it had been developed.

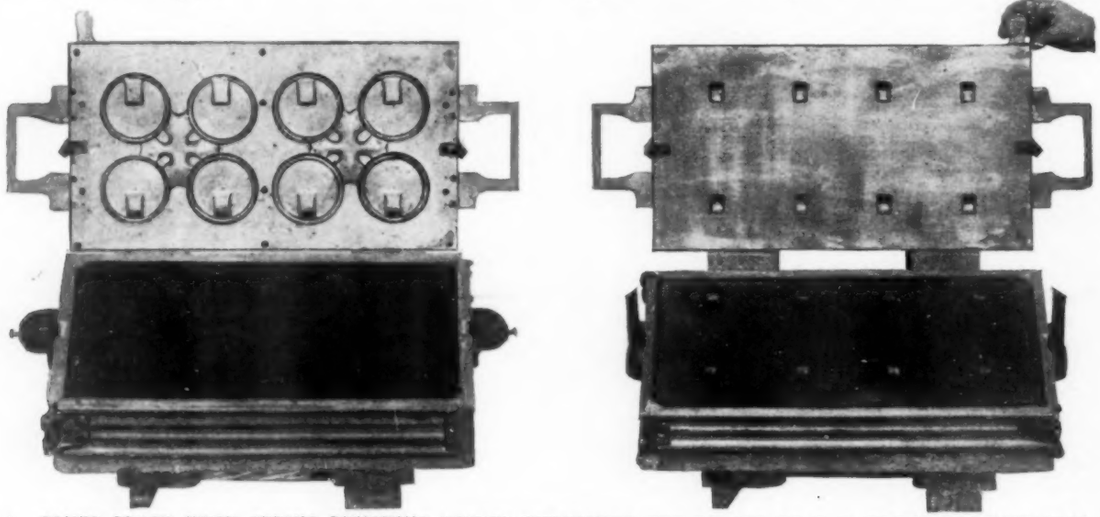


FIG. 1. COVER PLATE WITH SPRING PUNCHING DEVICE FURNISHED THE ESTATE OF P. D. BECKWITH, DOWAGIAC, MICH., BY THE GOODALE COMPANY, KALAMAZOO, MICH.
The aluminum strap flash shown was also made by the Goodale Company.

From this obscure beginning the use of aluminum matchplates had grown until today several of the largest foundries in this country and in Canada mold practically all of their castings from these plates, and in this development no one has played so important a part as Mr. Matthews, who now has general charge of the foundry for the Goodale Company, Kalamazoo, Michigan, organized for the sole purpose of supplying foundrymen generally with aluminum matchplate equipment. These plates have revolutionized the art of molding in the modern foundry. To anyone unfamiliar with this new method of molding the savings it effects are almost beyond belief. One of the largest stove companies in the United States, which has recently begun using plates made by the Goodale Company, and now has about 200 in operation, reports an average reduction in the cost of molding of over 50 per cent. and the molders themselves earn higher wages than formerly. In addition, the use of aluminum matchplates eliminates absolutely all pattern repairs and the annoying delays in production due to such repairs, which always occur when work is required most urgently. They had kept several men busy in their pattern shop repairing broken patterns. That expense is now profit.

By the use of matchplates upwards of 10 per cent. is saved in iron, due to the fact that molders are not able to rap the patterns down in the sand. Think what this means in a shop melting 25 tons of iron daily; 10 per cent. of 25 tons—2½ tons of iron a day—300 working days in a year—750 tons a year at $30 a ton, and iron is easily worth $30 a ton at the cupola—$22,500 a year saved in iron alone, and an equal saving is made in

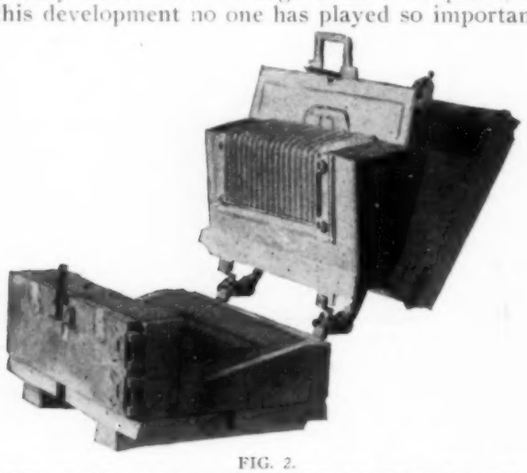


FIG. 2.
BASKET GRATE MADE BY THE GOODALE COMPANY FOR THE ADAMS COMPANY, DUBUQUE, IA. BENCH PLATE WHICH ROLLS OFF FOUR ½-IN. GREEN SAND CORES ¾-IN. DEEP.

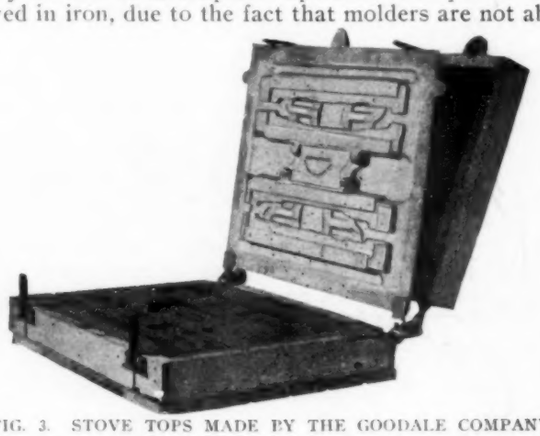


FIG. 3. STOVE TOPS MADE BY THE GOODALE COMPANY.

other metals. Iron is not the only saving of note by reason of a molders inability to rap the patterns down. The very fact that the castings are exact duplicates of the patterns except for the shrinkage eliminates practically all of the grinding and fitting. Then, too, perfect castings are made by inexperienced men. This does not mean that only unskilled labor should be employed on these plates. Far from it. The old experienced molders work on them to better advantage to themselves and the firm than new men, but when there is a scarcity of good molders it is possible to set men at work molding from these plates who have never before been inside of a foundry. Perhaps a brief explanation of the method of molding from these plates will be of interest.

FIG. 4. BASE BURNER MICA FRAMES MADE BY THE GOODALE COMPANY.

Starting with bench work the plate is placed between the cope and the drag of the sand flask, drag up, sand is then riddled onto the plate and the drag filled, rammed, struck off, and bottom board placed; plate and flask are then rolled and the same operation performed. The cope is then lifted and set aside and the plate drawn. Fig. 1 shows the flexible guides used on all plates made by the Goodale Company which engage the drag pins and prevent any shift in drawing the plates. The cope is then set back and the mold

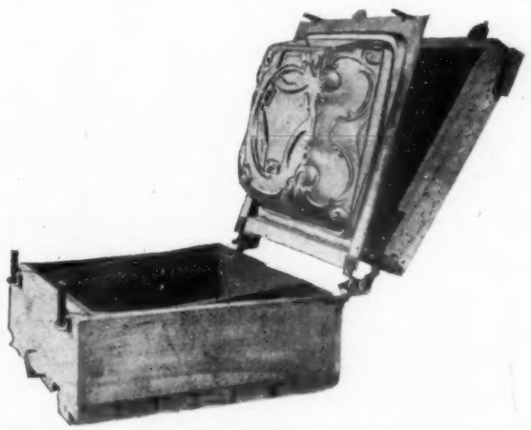


FIG. 5. BASE OF AN OAK STOVE MADE BY THE GOODALE COMPANY.

thus closed is ready for the metal. On large bench work both the cope and the plate may be rolled up by means of a most ingenious hinge, described later, but experience has shown that lift off bench plates equipped with this flexible guide are far more satisfactory excepting on large molds.

Fig. 2 shows a basket grate, plated and in use on a roll up hinge. Note the four green sand cores. These are ¾ of an inch deep by ½ inch in diameter, with only 1/32 of an inch draft. Yet by the use of the Goodale hinge this plate is rolled off these cores without any tearing and without giving them any more draft. On floor work the molding operations are similar to those employed on the bench. Owing to the strength of the alloy used, plates made by the Goodale Company never require a frame support to be used in the cope to prevent the plates from springing when the drag is tamped off. Their patent roll up hinge shown in use in Figs. 2, 3, 4 and 5 absolutely prevents any shift in rolling over or in rolling out. A similar device is made use of to support the plate

FIG. 6. A PLATE OF STEEL RANGE ASH PIT AND FIRE DOOR FRONTS, FURNISHED BY THE GOODALE COMPANY.

in an upright position, after having been rolled up from the drag, while facing, etc., is shaken into the mold for printing. The combination of the flexible guides, seen on all plates herewith shown, and the locking device insure absolutely perfect return of the plates for printing.

In so far as THE METAL INDUSTRY knows, the Goodale Company, Kalamazoo, Michigan, is the only concern in the world devoting its entire time and attention to the manufacture of aluminum matchplates. They are especially equipped to produce these plates in the shortest possible time and at the lowest cost. The have a large, well lighted factory, 60 x 120, two stories high, with a molding shop 60 x 60. Their plates are in use in all parts of this country and in Canada and at the present time they are working evenings in an effort to keep abreast of their orders. From this it appears that the experimental stage of the aluminum matchplate has been passed and it is now but a question of time, and a short time at that, until the foundry which is not equipped with aluminum matchplates for use in connection with molding machines will be entirely unable to compete with the shops using this comparatively new method of molding. It is said the molders themselves prefer matchplates to the old style patterns—they work better—the castings are more perfect and require little, if any, grinding. On the average the production is doubled and the cost decreased over one-half.

The consumption of nitrate of soda in the world for the first eight months of 1910 amounted to 2,125,232 tons, against 1,718,270 tons for 1909. This breaks the record by many tons. The increase in August amounted to 13 per cent. over the same month for last year.

SOME INTERESTING INFORMATION REGARDING LACQUERS OF VARIOUS KINDS USED IN THE FINISHING OF METAL AND WOOD

THE CARE OF LACQUERS.*

By W. A. Jones.†

The plater and finisher realizes the necessity of great care and cleanliness in the handling of work that is to be lacquered, as is shown by the cleaning and washing of the work after it is plated. Also the conscientious lacquer manufacturer appreciates the necessity of having all the ingredients pure, and combined in the proper proportion and properly clarified. The finished tank of lacquer is carefully tested out by the manufacturer, and if it dries down smooth, has the proper sticking quality, and does not show green drip, that tank and lacquer is marked O. K.

There is a big gap between that tank of lacquer and the same lacquer after it is applied to the work, which the plater has so carefully cleaned. In case of trouble the plater is apt to say—he knows he cleaned his work carefully, and the trouble is up to the lacquer. On the other hand, the lacquer manufacturer is apt to say—he knows his tank of lacquer was O. K., and can make his tests proving that the goods were O. K. when they left him. I am sure the day has gone by when the lacquer user and the lacquer manufacturer looked at each other with distrust. Both have realized that they are dependent on each other, and, in case of trouble, it is not important to shift the blame on one or the other. The main thing is to find out where the trouble is and very promptly correct it.

My experience has shown that a good deal can go wrong with the lacquer after it leaves the tank, and before it is dried down on the finished work. A few of these possibilities I have thought might be of interest to you. A great deal of the lacquer used is shipped out in tin cans of sizes one to ten gallons. These cans are shipped in crates and, if they should be rained on small quantities of water could readily get in the can and escape attention. This might result in the lacquer becoming somewhat cloudy; or, if the quantity of water was so small it would probably not show in the can at the time. However, this water would cause trouble as time went on, since water will decompose lacquer solvents, causing them to become acid. If the lacquer becomes acid from this cause and the can stand around for several months it would probably start the tin can to rust and give a yellowish tinge to the lacquer. We have at times been greatly bothered with this sort of trouble. You cannot pour out the last drop of water from the ordinary square can. To be on the safe side, we carry our stock of cans where they get the heat from steam pipes, so that when they are ready for use they are thoroughly dry, then before using they are washed out with thinner. This may seem a lot of bother, and it is; however, the man who buys a gallon of lacquer wants to get good results, and does not want to spoil his work.

There is another serious trouble from the use of tin cans. In order to make the solder hold, the edges of the tin are treated with a solution of zinc chloride. When this dries it necessarily leaves a slight amount of zinc chloride along the seams. This chemical is peculiarly powerful on organic solvents, causing what we term chemically "condensation." By this, I mean, it causes the molecules of the solvent to double up on themselves, giving a product heavier in body, and the final ending of the reaction is a resin. Of course, the reaction would not be strong enough in the lacquer to give a resinous product—but it will show up as a yellowish discoloration. Also, in causing this change the zinc chloride would make the lacquer become acid. The washing out of the cans with thinner removes a good part of the zinc chloride, but if there should be a large quantity it is a question whether the thinner would quickly remove it all.

There are certain grades of lacquer which, on standing in a tin can, become very dark, even though the can was dry when it was filled and if the zinc chloride was washed out with thinner. This is true of most of the well-known "Brush Lacquers." This darkening is, unquestionably, known to you all. I figure that this is caused, primarily, by galvanic action set up between the solder and the tin. This alone would not cause the discoloration. Practically all of the brush lacquers contain gums, and these being of an acid nature aggravate the trouble. However, if this lacquer was kept in a blocked tin vessel the discoloration would not take place. To my mind, this proves that the solder, and possibly the zinc chloride, plays a part. As soon as the acid gets through the coating of tin it attacks the iron, and the iron rust dissolves, which adds still more to the color.

Another package so commonly used is the barrel package. Half-barrels are scarce and seldom used. For brass lacquers a barrel answers fairly well. For silver lacquer it is objectionable, as the lacquer will, in time, dissolve the coloring matter from the oak. At best a barrel is an unsatisfactory package, because the barrel must be kept in a damp place to keep it tight, and we all know that moisture is antagonistic to lacquer. We use whiskey barrels for shipping our lacquer, but in spite of all the care we take we occasionally run across a barrel that has been paraffined or treated with glue. These are carefully washed out with thinner, but, in the ten or fifteen minutes required for washing, the thinner would not dissolve enough paraffin to show its presence. However, if this barrel stands around for a week with lacquer in it, it will slowly half dissolve this paraffin, so that it will give a very faint milky appearance to the lacquer. This will cause the lacquer to peel, and its appearance shows it is wrong. There is practically no way of getting out this paraffin, and, when this trouble is encountered we burn the lacquer up as worthless.

For shipping lacquer thinner, a barrel is a very bad package. A barrel is tight because the wood contains moisture. A lacquer thinner must be entirely free from moisture, and being absolutely dry the thinner will often take the water away from the wood. This goes on slowly and would not show the day the barrel is filled, but after the goods have been shipped out for a couple of days this will show up, and I have known cases where a barrel of thinner would be received one-half empty and leaking so little it would hardly be noticed. The only package left for shipping is the tin drum, and this is certainly by far the most desirable package of all, especially if a good grade of tin drum is used, and one having a very heavy coating of tin. In this case you eliminate the trouble of the solder and, of course eliminate the water trouble, which you have with the barrel. In this connection I would make a plea for ourselves, as well as all other lacquer manufacturers:

*National Electroplaters' Association Quarterly, Oct., 1910.
†Celluloid Zapon Company.

We ship out our lacquers in drums of ten gallon ssize and up. We have thousands of these drums scattered all over the country and they represent many thousands of dollars of real money. When we put a drum into service for silver lacquers, it is continued in that service, and is not used for brass lacquer, thinner or any other purpose; also, they are washed each time and looked after as carefully as our lacquer tanks themselves. Many times these drums, which are so expensive, come back to us after evidently having been left out in the factory yards for weeks or months and exposed to rain, and being so rusty and damaged as to be unfit for shipping out lacquer. Again, a gallon or so of lacquer will be left in a drum, the plug left out and water allowed to get into the drum, causing precipitation of the celluloid. We then have about a bushel of white muck to remove from the drum, and the cost of solvent and labor in cleaning same will probably cost two or three dollars. You can readily understand that a lacquer manufaccturer's drum account is a big item of expense; however, we wish to deliver our goods in the best posible condition, and therefore recommend this style package regardless of expense. I wish the finisher would realize that it is for his benefit, as well as for our own, that he keep this package in first-class condition.

I have, so far, spoken of the things that can go wrong, as they pertain to the manufacturer. Even if we take all the precautions indicated above and actually deliver into the user's hands a drum of lacquer that is first-class in every particular, he can readily through negligence spoil this lacquer so it will not give good results. In the first place—lacquer should never be left out where it is exposed to the sun. This is especially true of cans and drums, which will readily heat up in the hot sunlight, and has a decided tendency to make the lacquer go acid. You can prove this for yourself by taking some thinner that is perfectly neutral and put a small can of it where it will get the sun for two or three days. It will then show up decidedly acid.

Also, barrels and all packages should never be rolled up against steam pipes. This advice seems useless, but we have known people to roll a barrel of lacquer up against a radiator, and then express surprise when they found the heat had dried out the barrel and most of the lacquer was on the floor. We have even had them complain that we were at fault. The lacquer before it goes into the dip tank should be kept in a cool, dark place, and I would also advise that brush lacquers, or other lacquers used in small quantities should be bought in small lots, so a can cannot last more than a month or so. This is much better than buying a six months' supply at a time.

As regards the care of the lacquer in the dipping room: Galvanized iron should never be used as a dip tank, as it sets up galvanic action similar to that mentioned between the solder and tin in a tin can, except that the galvanized iron is much worse. Some lacquers, especially black lacquers will be entirely decomposed within a day or two, if left in a galvanized tank. Most of the solid matter and the black will be bound in a sticky mass in the bottom of the tank. For the smaller dip tank, white porcelain jars with covers are certainly most desirable. The porcelain can have no possible effect on the lacquer; also, if any work should drop into the jar it can readily be seen on the bottom. Where large quantities of lacquer are used of course these jars are out of the question. In that case block tin, or ordinary sheet that is heavily tinned is the best thing to use. Copper should not be used, for it will slowly make the lacquer become acid and turn green.

Where the work is dipped in the lacquer it is well for you to bear in mind that in lacquering it you are, in reality, giving the work a bath in the lacquer. Any saw dust, polishing material, or dirt that is left on the work is almost sure to be washed off into the lacquer. This is so small on the individual pieces of work as to seem unimportant, but when one thousand pieces are put through this tank in a day it becomes a very important factor; also, rouge and polishing material are bound together with some greasy substance like tallow, paraffin, etc. On bag frames and such type of work this is a serious item. I have known a first class lacquer to dissolve so much wax from the polishing material that in spite of the metal being clean, and plenty of heat being used, it was impossible to get any sticking quality. For the reasons mentioned I strongly advise the use of small dip tanks, so that when the lacquer gets dirty you have only a small quantity to throw away, or strain and clean up; also, the dip tank, by rights, should be emptied every night and strained through several thicknesses of cheese cloth. A larger tank is hard to clean up in this way, which is another point in favor of the smaller tank. In some shops we find they persist in using their dirty lacquer. If it gets in pretty bad shape it seems to me like taking a big risk. The worst thing we have to contend with is carelessness on the part of the boys who do the dipping, dropping pieces of work into the dip tank and leaving them there. This is so simple to correct that it seems impossible that it should cause so much trouble.

I am considered a crank on acid. At any rate, I make the test so severe that I make the manufacturing department feel that way. Our test is so severe in this respect that when we get a complaint of green drip or discoloration, that there is not one chance in a thousand of it being due to the lacquer—*as it left us.* My instructions are always to examine the dip tank the first thing to see if there are any pieces of work left on the bottom. Sometimes we will find a peck of work on the bottom, and I have known dip tanks in a large factory to have a slime fully an inch deep. Stop to consider the great care with which you wash and rewash your plated work. On the buffing you take great care to get up a nice luster; you dip in cyanide to brighten and watch all the various operations, then how insane it is to dip work prepared so carefully in lacquer that is dirty. If you have any doubt of the effect of this work on your lacquer, take a bottle of lacquer that you know is all right and drop into it a piece of plated metal and let it stand for a few days, and notice how green it will become. The copper will take the nitric acid away from the nitro cellulos forming copper nitrate, and will also take acetic acid away from the amyl acetate, forming copper acetate, both of which give a beautiful green solution that is not at all helpful to first class lacquer work.

From what I have stated above I think you will realize it is possible for the lacquer manufacturer to use great care, and the plater also to prepare his work carefully, and yet get into trouble. When such things happen, let us not criticise anybody but take it up with each other in a proper frame of mind determined to locate the cause and having found the source of trouble see to it that it does not happen in the future.

San Francisco has begun to send out postals soliciting for that city the Panama-Pacific International Exposition, which is to be held in 1915.

WATER DIP LACQUERS AND THEIR USE.*

By C. De Baun.†

Water dip lacquers are not, as often believed, lacquers in which water is used; their name is derived from the fact that after the metal has been dipped or plated, while still wet and without drying it may be dipped into the lacquer as described without in any way affecting the metal finish. The advantage of water dip lacquers is readily appreciated by manufacturers who are rapidly adopting them for many classes of small work. They are especially well adapted for bright dipped finishes, such as are usually used in basket work. Tarnish affects this finish almost instantly if it is allowed to dry and then lacquered in the usual way, therefore the lacquering must be carried out as soon as the dipping process has been finished.

The most flagrant example of tarnishing is in the case of plated work, particularly good copper plated, and to prevent tarnishing such goods must be lacquered at once. Even the customary drying out will usually not suffice to prevent the tarnishing, and the result is either the increase in labor in handling the goods, or the production of a large amount of imperfect goods. The work may be placed in a wire mesh basket, rinsed in cold and hot water, dipped into the lacquer which can be used so thin that there will be no accumulation or drip left, and the work can be dried in bulk without the pieces sticking together. Syphon out the water every morning from the lacquering tank, either with a rubber hose or by means of a faucet at the bottom of the tank.

A wire screen, nickel-plated and with a coarse mesh should be placed in the lacquer jar or tank three or four inches from the bottom. This will prevent the work from being dipped through the lacquer into the precipitated water which lies at the bottom of the jar. All dirt and foreign matter carried into the lacquer with the work will sift through the screen and can be drawn off with the water.

LACQUER MANUFACTURE IN JAPAN.

[From United States Consul-General Thomas Sammons, Yokohama.]

"Ye'no'abura" is a vegetable oil derived from the seeds of the Perilla ocimoides, an annual plant, which resembles the Perilla penkinenis, and uru'shi is the sap collected from the lacquer trees.

The oil is made in the Tochigi, Saitama, Chiba, Miyagi and Ibaraki Prefectures, which are famous for the production of seeds and oil. Sandy soil is favorable to the cultivation of the plant, and the yield is estimated at 20 bushels of seeds per acre. Statistics show that the annual production throughout Japan amounts to an average of 325,000 bushels, from which over a gallon of oil per bushel is extracted. The oil is retailed at 35 cents per sho (0.4766 gal.), and is used in the manufacture of paper umbrellas, lanterns, oil papers and artificial leather. It is also used in preparing materials for the manufacture of printers' ink, paint, varnish and lacquer.

COLLECTING LACQUER GUM.

The lacquer trees are occasionally cut down, but the usual method is to tap them about 9 ins. above the ground. The gum which accumulates is collected with a spatula made for the purpose. Four days after the first collection of gum the trees are tapped again. This process is carried on throughout the season, July to September. The trees used are generally 15 years old. A large tree is estimated to produce 90 grams (3.17 ozs.), while a small tree produces only 56 grams (1.87 ozs.) of the gum.

There are three different grades of gum: (1) Ro'iro uru'shi, a superior quality, of a greenish black color, non-adhesive, and almost transparent when applied as a paint; (2) se'chi'me uru'shi, an inferior quality, brown in color, and, owing to its adhesive properties, used for joint work, but not for painting; (3) Hana' uru'shi, a medium quality, resembling both the above in color and in adhesiveness, and purified by filtration through thin paper.

Refined lacquer contains 85 per cent. acid of lacquer and 15 per cent. water and organic matter resembling rubber. The juice dries by absorbing oxygen, which it can do only when the atmosphere is damp. With the addition of a little glycerine, the drying process requires only two hours, whereas, under normal conditions, more than ten hours are necessary. Alcohol is used in melting the material.

The gum is sold direct to the dealers in lacquer, who refine the raw material themselves. It is first passed through a filter made of cloth into a porcelain or wooden receptacle. The waste remaining in the sieve is rejected, and the gum which may still adhere to its sides is mixed with the yeno abura and strained again into the receptacle. The resulting liquid is exposed to the air and, after being carefully stirred for a day or two, it attains a standard thickness. Heat is used to evaporate the water which may remain. Coloring matter, kneaded with yeno abura, is added to the material while it is raw.

LACQUER PRODUCTION AND VALUE.

Statistics show that the lacquer is produced in the Tochigi, Aomori, Nara, Ibaraki and Ishikawa Prefectures. The Chinese product is still imported, owing to the gradually increasing demand for the domestic market.

The imports of raw juice, principally from China, amounted to 1,294,285 lbs., valued at $219,661, in 1908. The following statement shows the production of lacquer in Japan in 1903, 1906 and 1907, the latest for which statistics are available:

Description.	1903.	1906.	1907.
Number of trees	2,815,382	2,857,341	2,858,607
Quantity produced, lbs.	431,700	665,850	812,720
Value of production	$161,822	$259,085	$339,949
Price per lb. cents	37.5	38.9	41.8
No. of houses engaged	1,441	1,123	1,086

SUPPLY OF ANTIMONY IN CHINA.

Of the 22,000 tons of crude antimony exported from China last year United States Consul-General Amos P. Wilder, of Shanghai, says that Changsha produced about one-half, Hankow ranking second, while Yochow, also in the Hankow consular district, ranked third in the export of crude ore, refined and ash antimony, a total of over 29,000 tons of which was exported last year.

KJELLIN ELECTRIC METAL MELTING FURNACE.

The photograph of the electric induction furnace published in the November number of The Metal Industry, page 457, was incorrectly labeled as a Rochling and Rodenhauser furnace, while it is in reality a 4-ton 450 k.w. Kjellin furnace. This furnace is in use at Poldihutte, Kladno, Austria, and is manufactured by the American Electric Furnace Company, 45 Wall street, New York City.

*National Electroplaters' Association Quarterly, Oct., 1910.
†Egyptian Lacquer Company.

THE CHEMICAL ANALYSIS OF SPELTER.

A Detailed Decription of the Methods Employed for the Estimation of Common Impurities.

(Concluded from September)

By Andrew M. Fairlie.*

CADMIUM.

The following method (Method A) for the determination of cadmium in spelter was communicated to the writer as the method employed by the New Jersey Zinc Company:

Method A.—If the spelter is known to contain 0.5 per cent. cadmium or less, weigh accurately about 20 grams of the borings and brush into a 400 c.c. Griffin beaker, add 100 c.c. of water, then concentrated hydrochloric acid from time to time, in sufficient quantity to accomplish the solution of the zinc slowly, the object being to dissolve all of the zinc with the exception of about one gram. This undissolved portion will have precipitated on it *all* of the cadmium, as well as most of the lead. Transfer this undissolved zinc, while the action continues, to a small filter, and wash once or twice with hot water. The filtrate may be thrown away, as it contains no cadmium. Dissolve the residue in 5 to 10 c.c. of hot dilute (1:1) nitric acid, washing into a 200 c.c. beaker; add 10 to 15 c.c. of dilute (1:1) sulphuric acid, and evaporate to strong fumes. Cool, dilute, and filter off the precipitated lead sulphate, after standing until cold. Wash with water containing a little sulphuric acid. The filtrate will contain all of the cadmium, free from lead.

Neutralize carefully with ammonia, dilute to about 500 c.c., make faintly acid by the addition of eight drops of hydrochloric acid, heat to about 75 degs. C. and pass a rapid stream of hydrogen sulphide to saturation. In case no precipitate appears, and the solution merely turns yellow, add, drop by drop, ammonia, stirring constantly, until a decided precipitate of zinc sulphide is shown. Allow to settle a few minutes, and filter at once, washing once or twice with *hot* water. Dissolve the precipitated cadmium and zinc sulphides on the filter with hot dilute (1:1) hydrochloric acid, allowing the liquid to return to the beaker in which the precipitation was made. Dilute, neutralize, etc., as before, adding eight drops strong hydrochloric acid after neutralizing, and precipitate with hydrogen sulphide from the hot solution, about 500 c.c. in volume. Repeat until a filtrate is obtained which shows *no* zinc on the addition of ammonia in excess. Collect the final precipitate of cadmium sulphide on a weighed filter, wash, dry at 100 degs. C., and weigh. Deduct the weight of the filter, and from the weight of cadmium sulphide found calculate the percentage of cadmium in the spelter.

By keeping the solutions hot they can be filtered with the greatest ease. Moreover, there is no precipitate of sulphur to interfere with the direct weighing of the cadmium sulphide. Be careful that the action of the acid in the preliminary operation of dissolving out the bulk of the zinc is not too rapid. In case the whole of the sample should be inadvertently dissolved, the cadmium may be re-precipitated by some fragments of zinc known to be free from cadmium.

There are certain features of methods B and C (see below) which commend themselves to some operators, who have adopted one or the other of these methods in preference to method A.

Method B.—Dissolve 20 grams of the spelter borings as described under Method A; filter off the residue and dissolve it in hot dilute (1:1) nitric acid; add 10 c.c. dilute (1:1) sulphuric acid and evaporate to fumes. Cool, dilute, cool again, and filter off lead sulphate. If copper or bismuth are present, precipitate with metallic iron in the boiling filtrate. If not, precipitate the cadmium with metallic aluminum. The solution for the precipitation of cadmium with aluminum must be rather strongly acid, and must be boiled. The cadmium may now be collected and weighed as metal, or it can be dissolved in nitric acid, the solution evaporated to fumes with sulphuric acid, diluted, neutralized, made faintly acid, and precipitated as cadmium sulphide. The sulphide may then be warmed with acid ferric sulphate, and titrated with permanganate, observing the precautions given in Sutton's Volumetric Analysis, 9th edition, p. 127. Waring has pointed out that a simple way to obtain an atmosphere of carbon dioxide is to drop a little sodium bicarbonate into the beaker and keep it covered with a watch glass. The iron factor for the permanganate multiplied by 1.003 equals the cadmium factor.

Method C.—Proceed exactly as in method A as far as, and including, the first filtration of the zinc and cadmium sulphides. After washing these sulphides, transfer filter and precipitate to the precipitating beaker, and add dilute acid, containing either 5.5 per cent. absolute hydrochloric acid or 8 per cent. H_2SO_4, without heating, but with vigorous stirring. The zinc sulphide goes into solution, while the hydrogen sulphide evolved prevents solution of the cadmium sulphide. Add 125 c.c. hydrogen sulphide water, filter, and wash with hot water. The cadmium may then be determined with acid ferric sulphate and permanganate as in Method B.

*Chemist, Tennessee Copper Company.

NEW BRITISH ALUMINUM ALLOY CLARUS METAL.

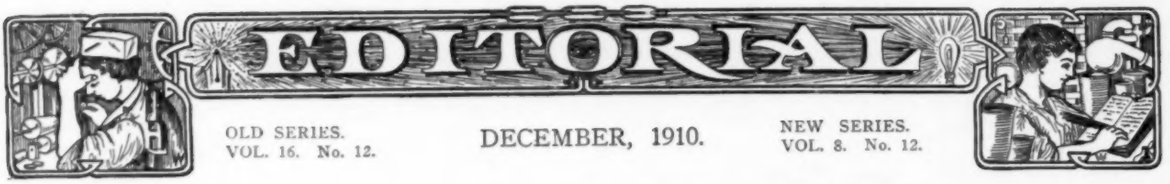
Gabriel & Co., 4 A. B. Row, Birmingham, has discovered and patented a new alloy of aluminum, which is called Clarus, and for which many claims are made. It is claimed that this alloy is at least 60 per cent. stronger than ordinary aluminum, and that its weight is one-third that of brass of an equivalent volume; that it will take a very high polish, equal to that which can be obtained with silver; that atmospheric surroundings do not cause it to tarnish; that castings are not brittle, but can be bent cold; that it is suitable for castings of any size, and that in all circumstances such castings have been found to be sound and free from blowholes and other defects.

It is claimed that the new alloy is excellently suited for automobiles and for electric railroad, railroad car, and aeroplane fittings. The manufacturers state that it has been made into sheets, drawn into wire and into tubes and rods; that they have spun it and stamped it, and that they have made hand-pole brackets for the underground electric railways of London, for railway carriage fittings, for carriage furnishings, street-car fittings, and automobile and motorbus fittings.

COST OF PRODUCTION—PATENT RIGHTS.

They assert that it is very little more costly than pure aluminum. Inasmuch as in aluminum alloys much spelter has been used to reduce the cost, the cost of production of this alloy would be greater probably than that of alloys with heavy percentages of spelter, etc. The alloy Clarus is made from aluminum of 98 to 99 per cent. purity.

The owners of the patent are prepared to sell the exclusive rights in the United States in preference to permitting its manufacture in the United States under license or exporting the finished product, and are ready to demonstrate its usefulness.



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THE SETTLEMENT OF THE WAGES QUESTION IN THE BRASS TRADE IN GREAT BRITAIN, AND EXISTING AMERICAN CONDITIONS.

The announcement that the question of wages in the brass trade had at last been settled must have come with a sigh of relief and thankfulness to all those who have watched the progress of the negotiations, which have extended over such a long period, and as at some points the differences seemed insurmountable, those responsible on behalf of both masters and men are to be heartily congratulated on such a satisfactory termination, which must have a beneficial effect on the coming year's work for both parties.

The new regulations, appropriately enough, came into operation on the first pay day in December, the month with which has been associated from time immemorial the feeling of peace and good will, and we trust that these sentiments will be carried into effect in the subsequent working of the new regulations.

Reverting to the questions in dispute, we may say, with perfect impartiality, that both sides had cause for complaint, but especially the masters as regards the question of the standard of workmanship possessed by a great many of their workmen. No one will deny the fact that, owing to the keen competition which exists in the brass-foundry trades, the first must, of necessity, get full value for their money which they pay in wages to their workpeople, in order to reduce the price of the manufactured article to as low a figure as possible, or else find themselves unable to compete with their competitors.

Now the trade during the last few years has altered in the fact that, as prices are so cut, the wages, which are the largest item of cost, must be reduced to a minimum; hence machinery has been designed and is used which is capable of doing work which was formerly only accomplished by skilled hands, in such a manner that youths, and even girls, are capable of working them, as, to a large extent, the machines work automatically. Hence when a youth leaves school and enters the works he is often put to operate one of the machines; becoming proficient, and therefore being able to turn out the work at the maximum rate which the machine is capable of, and also working on "piecework," he earns more money than a youth of his own age and learning a trade in the old-fashioned way by going through all the branches, and even if offered a chance to go on the bench and learn this part of the trade he more often than not refuses, as he cannot earn as much as he is at the moment by remaining at his present work.

Again, should his first job be on the bench, he soon becomes proficient in using the file to enable to turn out the particular work he is engaged on at a rate which brings him in a wage much higher than his experience warrants, as he is also working on the piecework system; hence should he be offered the chance to get on to more experienced work, he probably refuses it because he would not be able to earn as much for the moment. It is easily seen, therefore, that when the youth, in either case, has been engaged to do the same work for some years and has reached an age when he expects to earn better wages his money is still the same, as he cannot do the work faster than he did, say after six months' practice, hence he probably leaves his employers, thinking he can earn more by going somewhere else, and when he applies to another firm he soon finds out that his abilities are practically limited to one particular kind of work and one rate of wage, which is not sufficient to keep him comfortably should he get married, etc.

The different grading of the men in the new regulations will tend to put a stop to this system, as anyone entering the brass trade will understand that if he wished to earn a certain wage he must learn the various kinds of work which that particular grade demands a man should know and must pass a practical examination before an independent authority, if his employer wishes, before he can hope to be entitled to the wages he desires, in order to be able to turn out the work in a manner which is necessary for his employer to be able to profitably utilize his services.

Another thing is that it will encourage the enterprising youth to rise from grade to grade until he has reached the top, knowing at the same time that he will be sure of earning a wage consistent with his increased abilities, and, therefore, not only prove beneficial from the standpoint of both master and man in the knowledge that both are getting "full value for their money," but it will develop a mutual feeling of trust which will be for the general good and advancement of the brass trade.

The new agreement regarding the wages of brass workers referred to above is the result of the conference between the Brass Masters' Association, the National Society of Brass Workers and Metal Mechanics on one side and a British Conciliation Board selected to settle a wage question dispute.

According to the new agreement which goes into effect this month, the rates of wages to be paid brass workers according to the grade in which they are placed will be the minimum, and will advance with the qualifications and capacity shown by the workmen in each grade. The rates of wages are not yet made public, but the grades of workmen are announced. Full opportunity will be afforded workmen to prove their qualifications and ability.

The agreement advances wages over those at present paid, and it is intended to absolutely do away with sweating in the brass trade. At the same time it is hoped to result in a much closer relationship between the brass trades schools of the district, which is the center of the brass trade of the United Kingdom, the employers and the workmen, and it is hoped that it will also result in such improvement of the quality and character of the work as to materially strengthen the trade. According to the agreement there are five grades of workmen to be provided for, and each grade is to be denoted by different colored adhesive stamps to be affixed to a membership card. The grades are as follows:

A. Improvers of 21 years of age.

B. (Green grade.) Qualifications: 21 years of age. Dressers who can turn, file over at the vise, and are used to tapping and plate screwing. Polishers who can rough, plain mop, and emery bob. Ordinary dippers and common bronzers. Common burnishers on lathe and vise.

C. (Brown grade.) Qualifications: 21 years of age. Dressers who can turn and screw inside and out, file flat and true at the vise. Polishers, colorers, and all-round roughers. All-round dippers and bronzers. Advanced burnishers on lathe and vise. Repairers and chasers.

D. (Blue grade.) Qualifications: 21 years of age. Dressers who can turn, screw inside and out, file square and flat at the vise, and finish own work throughout. Polishers who can do all processes and finish into lacquering room. Expert burnishers and pattern chasers. Art bronzers and colorers with a practical knowledge of the art of coloring.

E. (Red grade.) All previous qualifications plus capacity for working to scale drawings or blue prints or efficient pattern makers.

It is arranged that the grade card shall be handed to the workman by the society and shall have provisions for his number at the factory at which he is employed, the name of the society, and his name and signature. These various grade cards are to be issued by the executive of the brass workers' society, but the employers shall have the right to challenge the qualification of the holder of any ticket and require him to submit himself to an examination by the managers of the municipal brass trades school in conjunction with representatives indicated, one by the association of employers and the other by the society of brass workers, who in no case shall be interested parties and whose decision shall be final. If the decision is in favor of the workman, the employer is to pay a fee of 10s. ($2.43) to the municipal brass school.

Should the decision be adverse to the workman, the society shall have discretion to put such workman back one grade, but in either event the employer is not bound to reinstate the workman whose qualifications have been challenged. The examination is to include the various processes in the workman's particular branch of the trade, and the result of the examination is to be indorsed on the workman's card. If three adverse decisions are indorsed, the workman shall be put back one grade.

When a workman has been duly graded by the society he shall have the right to qualify for a grade higher by submitting himself to an examination by the authority constituted as mentioned above if required to do so by his employer. His work and capacity shall be examined in connection with a representative

nominated by the association of employers and with one nominated by the society of workmen. If the decision is favorable to the workman, the employers are to pay a fee of 10s. ($2.43) to the municipal brass schools; if the decision is adverse the workman or his society is to pay the fee, and the workman is to remain at least six months in the same grade as he held before the examination. It is hoped that it may be arranged that the distribution of grade cards may be made the joint duty of the society and the managers of the municipal brass school.

Conditions as to overtime are to continue in accordance with the award of the late Sir David Dale made December 10, 1900:

> Where workmen are desired by their employers to work more than 54 hours in any week, time and a quarter shall be paid for overtime to day workers, and in case of piece workers that the piece work earning shall be supplemented by a payment of one-fourth of what the workman would be rated at per hour if and when working by time.

One week's notice is to be given by either party to terminate an agreement whether the workman is working day or piece work and the notice is to be given at the end of the working week in each respective factory.

In America the welfare of the metal workers interests are looked after by the Metal Polishers, Buffers, Platers, Brass Molders, and Brass and Silver Workers' Union of North America. While this society does not grade its employees in the same manner as outlined above, an investigation is made of a worker's qualifications and he must have a definite standing as a journeyman. There is no maximum wage rate; but it is the aim of the union to establish a minimum wage rate in every locality and whatever this minimum the various crafts are graded according to their efficiency and competency.

A candidate making application for membership in the organization must furnish proof that he has worked continuously at the business for a period not less than three years. A committee investigates his claim. If he comes in as an apprentice, then the records show the length of time he has worked. When the man becomes a journeyman, it is demanded that he be paid the minimum rate, but the manufacturers are also assured that they are not expected to keep any one who is not competent. This is as far as the organization goes in the matter.

FOREIGN APPRECIATION OF AMERICAN TALENT.

Apropos of what we said in the November number of THE METAL INDUSTRY regarding the interest taken by foreign manufacturers in American ideas and methods of brass manufacture, the following taken from Anderson's history of the town and city of Waterbury may prove interesting:

* * * "Mr. Holmes was to undertake both. He was willing to risk something in the interest of private enterprise and for the industrial independence of his country, and he proved himself equal to the emergency. First, through the influence of those who were to manufacture the machinery at a large profit, he secured permission to export it, the fact that he intended to export skilled workmen also not being made known. Then while the machinery was being prepared he proceeded cautiously and through second parties to secure the necessary workmen. These with their wives and children made a company of about twenty persons, and he managed to get them started for America by the time the machinery was ready. So large a company could not move away, however, without exciting the notice of the manufacturers. Finding that Mr. Holmes had also ordered machinery, and concluding that their craft was in danger, they at once made a remonstrance to the government against allowing the machinery to be exported. The remonstrance was too late. Mr. Holmes had already received his permission to export which could not easily or speedily be revoked and he lost no time in availing himself of it. Fearing, however, that he might himself be detained on a charge of enticing workmen from their employers, he determined not to return by way of Liverpool, but proceeded quietly across the country through Wales, and embarked from Holyhead. In due time he arrived in Waterbury with the company of workmen he had engaged in Birmingham."

* * *

The foregoing excerpt reflects the difficulties surrounding the early manufacture of brass in this country, referring as it does to a visit of Mr. Israel Holmes in 1831 to England in quest of both machinery and workmen.

In our personal column we make mention of the engagement of the services of Ferdinand Deming, of Waterbury, Conn., by the Kingston Metal Company, Smithport, near Birmingham, England. Mr. Deming has been called by these people in an advisory capacity, they wishing to learn intimately concerning American sheet, rod and wire brass and copper, and seamless tube machinery and manufacturing practice. Presumably it is thought by our English friends that in the interval which has elapsed since Mr. Holmes found it necessary to import workmen from England we have in this branch of manufacture outstripped them and that they now can learn of us. This speaks well for American ingenuity and skill.

THE METAL INDUSTRY 1910 INDEX AND PRIZE OFFER.

With this issue of THE METAL INDUSTRY is published the Index for 1910. There are several new features of this index which we hope will prove valuable to our many readers. In the first place we have arranged the index so that the various departments come in the same order in the index as they appear in the paper. Then we have indexed all the notices of patents published during the past year. This section is also cross-indexed, first giving the name or description of the invention and then giving the name of the invention or patentee, thus making it very easy to look up a patent whether the nature of the

invention or the name of the inventor is known. We have spent considerable time and thought over this index and feel that it is now as complete as it is possible to make it, but we should be pleased to receive criticisms and suggestions from our readers looking to further improvements.

In this issue of THE METAL INDUSTRY we also publish an advertisement offering prizes for suggestions of titles for articles to be published in 1911. The prizes offered are of the best books published on Founding, Finishing and Plating subjects and this should prove an easy opportunity for any one to secure valuable additions to his library with very little effort.

THE METAL INDUSTRY wishes to publish during the coming year articles upon all subjects relating to the metal industry. To this end we are willing to give prizes for the best suggestions for such subjects. So get busy, look over the previous issues of THE METAL INDUSTRY, judge of the class of material already published and make your suggestions; either for the continuation or enlargement of some subjects already treated, or of some new feature never before touched upon. Send in your ideas and the chances are that you will win a prize of a book that will certainly be worth owning.

NEW BOOKS

"PROCEEDINGS MASTER CAR BUILDERS' ASSOCIATION." Vol. 43, 1909. Size, 6½ by 9 inches; 682 pages, with numerous specification diagrams. Bound in black cloth with gilt lettering.

This book is the annual report of the association covering its annual convention. This particular volume is number forty-three, and reports the forty-third annual convention, held at Atlantic City, N. J., June 21-23, 1909. Included in the book are lists of previous conventions, names of officers for 1909-1910, names of standing and special committees, names of members and the constitution of the association. The report gives a complete account of the happenings of the convention. The daily sessions held by the association were closely followed and the entire proceedings most carefully recorded in the volume. There are also given a large number of diagram sketches of standard journal-boxes, bearing lids and wedges, as well as of other portions of railway cars. These sketches show the various changes advised by the various committees in an endeavor to produce standard materials from standard specifications.

Obituaries are given in the back of the book of men prominent in the Master Car Builders' Association as well as in railroad circles. There is also a seven-page index, which is of great convenience in locating a particular subject.

CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

GUN METAL FINISH ON IRON AND STEEL.

To the Editor of THE METAL INDUSTRY:

I gladly welcome all fair and scientific criticism on my article on "The Gun Metal Finish," in the October issue of THE METAL INDUSTRY. I differ, however, from the conclusions arrived at by my "Ironic" friend in the November issue. Allow me to call your readers' attention to a few of his erroneous statements. He argues that the finish is not the black oxide of iron, and then closes with the statement that he has tried the formula, and produced good results, but not always. If he has produced the finish, and it is not the black oxide of iron, will he inform your readers what it is? He asks, "How can a solution of $2Fe\ Cl_3$ precipitate itself out as an oxide?" My answer is that all ferric chloride solutions show a disposition to precipitate the iron in the oxide form, and I refer him to the United States Dispensatory as my authority. In the process I describe the HCl is driven off, leaving the iron in the form of oxide. Both the FeO and Fe_2O_3 are produced in the steaming chamber. It is true I have not accounted for the alcohol in my equation, but I also stated the finish can be produced without it. Experience, however, proves that better results can be produced when using the alcohol. His speculations upon the nature and production of the various oxides of iron are misleading, and have no value in the practical working of the process—in which unquestionably the black oxide of iron is produced.

In conclusion, I desire to state that this process is very old, possibly older than chemical nomenclature, and it is known and used in every gun shop in the country, and also on hardware of every description. I can assure your readers that the process is practical and reliable, although it is too costly to produce on cheap grades of work. I am quite sure that my "ironical" friend will always be successful in producing it if he follows directions and gains the necessary experience through patience and practice.

"IONIC."

IRONICAL REPLY TO "IRONICS."

To the Editor of THE METAL INDUSTRY:

I beg to say that the argument sent in reply to my criticism is silencing.

"IRONIC."

STANDARD FOUNDRY FLASKS.

To the Editor of THE METAL INDUSTRY:

In giving the figures of measurements for you to illustrate the proposed standardization of foundry flasks that appeared on page 374 of the September number, I made a mistake in giving the distance across the flask from the center line to the center of the pinholes. It should be one and one-sixteenth inches (1 1/16 ins.) instead of one and three-eighths inches (1⅜ ins.) greater, as one and one-sixteenth registers within about one one-thousandth of an inch with twenty-seven millimeters. It also locates the pinholes closer to the sides of the flask, which is desirable.

All flasks should have additional lugs or ears on the right angle center lines, at both ends and sides, so the match-plates can be used to advantage on snap-flasks, and for all machine molding.

M. W. G.

Highwood, N. J., Dec. 12, 1910.

ECHOES FROM THE OUTSIDE.

To the Editor of THE METAL INDUSTRY:

The recent article appearing in your journal* on the "Limits of Accuracy on Chemical Analysis," strikes me as being well written and to the point and should therefore result in considerable change in the practice of a great many of our chemists, as most of the points held up to criticism are rather common practices.

C. T. BRAGG.
Chemical Engineer, Ohio Brass Company.

Mansfield, Ohio, Dec. 12, 1910.

*THE METAL INDUSTRY, September, 1910.

AMERICAN SOCIETY FOR TESTING MATERIALS.

Announcement is made that the American Society for Testing Materials has now 1,341 members, 61 applications having been favorably acted upon since the recent Atlantic City meeting. The gain in the past year is thus 179. A membership of 2,000 is aimed at by the time of the international congress, which will be held in the United States in 1912.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ALLOYING

Q.—We have had two samples of brass analyzed, and the sample that showed the higher copper content proved to be the hardest for working. The samples were prepared from two kinds of copper and zinc, and were cast and used for the same purpose.

A.—A chemical analysis of a sample of brass, as a general rule, will serve merely as an index of its character as to chemical properties. The working qualities of brass are very frequently not revealed by chemical analysis, as there are so many conditions surrounding the working of brass that have to be taken into consideration. For instance, two samples of brass may be prepared, one with a considerably higher content of copper than the other, and the difference in the pouring temperature of the two samples may be made so that the one with the higher percentage of copper may be the hardest to roll or draw. In the same manner the mechanical properties of the brass as it goes through the various operations of the mill may produce a harder texture in the sample containing the higher percentage of copper, so that as far as determining its working qualities by means of chemical analysis, the analysis will prove worthless. It is only where other metals besides copper and zinc are used in the manufacture of brass that a chemical analysis, backed by sufficient metallurgical knowledge and experience, will give one a clue to the mechanical and workable properties of the sample.—K.

ANNEALING

Q.—Have you any receipt for a protector for fire coat while gold work in bar is being annealed?

A.—Boracid acid is undoubtedly the best flux to use when annealing.

BRONZING

Q.—Kindly tell me how I can remedy my brass solution? It has a blue cast and shows up acid.

A.—Add to your solution two or three ounces of sal ammonia to each gallon. This will have a tendency to neutralize the free acid and give you a white deposit. You can maintain your nickel solution in excellent working condition by adding occasionally one to two ounces of single sulphate of nickel and a like amount of sal ammoniac to each two or three gallons of solution.—C. H. P.

BURNISHING

Q.—Can you please tell us the right soap to use to obtain the best results in barrel burnishing brass shell work?

A.—Borax soap gives the best results, but any neutral soap can be used. The common whale oil soap that is used extensively in cleansing polished brass articles by the boiling out method, when used in the proportion of one to two ounces to each gallon of water, gives good results. Any substance of a soapy nature that will soften the water and does not tarnish the metal surface can be used, as a good washing powder or a borax powder water.—C. H. P.

CASTING

Q.—Will you kindly tell us how to remedy the trouble we are having in casting name-plates? The plates are oval, with raised letters and border. We get only one plate out of a casting when two are set up in one flask and sometimes none.

A.—You should ram both cope and drag of mold hard around the edge, so that there will be no danger of "closing-off" the casting when the flask is weighted and poured. In addition to this, the mold should be skin-dried and gated with a broad, thin gate that reaches well around one side of the casting.—J. L. J.

CLEANING

Q.—What would you recommend for removing beeswax from cast iron patterns? These patterns are to be thoroughly cleaned for plating.

A.—To remove beeswax from cast iron patterns prepare a strong solution of caustic potash in the proportion of one pound of potash to each gallon of water. Immerse until the wax is all dissolved. The solution should be used at the boiling temperature. Turpentine is also a natural solvent for beeswax, especially when used hot.—C. H. P.

COLORING

Q.—Will you kindly publish the method of coloring copper a chocolate color, used by urn makers and called "tea urn bronze?"

A.—To produce a chocolate color upon copper tea urns or the so-called tea urn bronze, proceed as follows: Polish the copper surface in the usual manner to give a clear luster, and then cleanse by the aid of potash solution and dilute cyanide solution to remove the slight oxidization formed by the potash immersion. Now prepare a solution consisting of

Sulphide of barium	½ oz.
Water	1 gal.

Use the solution at a temperature of 160 degs. Immerse the copper urn in the barium solution for a few seconds until uniformly colored a brownish black; now remove, wash in clear, cold water, then dry out in the usual manner. Next proceed to scratch brush the urn, using a soft or worn brass wire brush for the purpose. The brushing brings out the color and produces the soft luster. By a little manipulation of the oxodizing solution, either by adding more or less of the barium sulphide, any tone in brown or chocolate can be produced.—C. H. P.

Q.—Can you give me a good verde for brass and copper, one that will not rub off when lacquering?

A.—Use a solution consisting of the following:

Chloride of zinc	1 oz.
Ammonium chloride	1 oz.
Sulphate of copper	½ oz.
Glycerine	½ teaspoonful.
Water	1½ pints.

Dissolve in warm water and allow to cool. Coat the articles with a soft brush, then allow to dry until the green forms the stipple with a stippling brush, moistening the same with a little of the solution. When perfectly dry use a thin lacquer for the first coat, flow this in if possible or use a camel's hair brush. After this is thoroughly dry, use care to go over the surface lightly. When the second lacquer is thoroughly dry wax the surface. It is advisable when producing the verde on copper to coat the surface with a dilute solution of sulphuret of potassium solution to produce a dark background. This enables the solution to act quickly and produces a better tone.—C. H. P.

DEPOSITING

Q.—Please give me a formula that will deposit a deep red smut copper on novelties so that the background will show red after gilding.

A.—For this purpose produce a solution as follows:

Cyanide of Potassium	6 ozs.
Carbonate of Copper	3 ozs.

Bisulphate of Soda	4 ozs.
Water	1 gal.

With a strong current this will give you a darkish red smut. A weak current will give you a regular copper deposit.—C. H. P.

ENAMELING

Q.—We should thank you to give us a receipt for enameling metal, both in brass and copper, stating the style of stove required and the heat same requires to undergo?

A.—We presume you refer to what is termed in the United States soft enameling, the same as applied to iron beds and other such like articles. For this purpose is used what is known as baking enamels, which consist of gum copal, white zinc and white lead, with a mixture of linseed oil and turpentine. The method of applying where possible is by dipping; if this is not possible, then the enamel must be brushed on the same as painting. The latest method is to spray it upon the surface, using an air pressure of 40 to 50 lbs. This insures an even coating. The ovens should be built in sections from boiler plate iron, usually ⅛ in. thick. These sections are made sufficiently large for the purpose. Each section can be bolted to each other, making a series of ovens, and should be reinforced by angle iron; of course, one or more sections can be used for drying purposes, but where a greater heat is required, this is generated by Bunsen flames, placed below the ovens, and yet so enclosed that no heat is lost. Provision should be made so that the flames do not come in contact with gases generated in drying. This is usually accomplished by using a number of thicknesses of woven wire above the flame, similar to the Davy lamp. An outlet should be placed in the oven so that the vapors can escape. A temperature of not less than 212 degs. should be used, although some enamels will stand a heat of 300 or 400 degs. It would be of no advantage to you to prepare the enamels yourself, unless you had the necessary facilities for grinding the colors. Any color maker's handbook will give you the necessary information upon the subject.—C. H. P.

FACING

Q.—What is the cause of a skin-dried mould scaling and cores raising? What would be the best facing mixture for same?

A.—A good facing may be made from No. 0 Albany sand by drying carefully so as not to burn the sand, then roll and pass through a No. 22 sieve. Finally wet down with water that contains a handful of salt to each pail of water. The raising of cores may be due to their being improperly anchored to the core prints, being too short and a number of other causes.—J. L. J.

FLUXING

Q.—Please tell me the best way to prevent oxidization of melted tin and lead while casting, also the cause and remedy for frosty appearance of some work as it comes out of the mold, using an alloy, tin, 85 per cent.; lead, 15 per cent?

A.—A good flux for melted tin and lead may be made by mixing equal parts of sawdust, powdered resin and sal ammoniac. The frosty appearance of your work is likely due to the pressure of a small amount of zinc. We do not know of any satisfactory substitute for the tin 85, lead 15 mixture. By using pure tin and pure lead you may be able to reduce the percentage of tin somewhat and still have your work look all right.—J. L. J.

GILDING

Q.—Will you kindly tell us what we can add to our gold solution in order to plate yellow something like the color of English gold?

A.—To produce a more yellowish gold deposit from your solution add to each gallon four ounces of phosphate of soda, using care not to use too strong a current. Reddish gold tones are frequently due to the use of too much current.—C. H. P.

MIXING

Q.—Will you kindly publish a formula for making a white metal, containing not more than about 50 per cent. of tin, and entirely free from lead, at a price which shall not exceed about $350 per ton?

A.—The following mixture will meet your requirements as nearly as anything we know:

Zinc	40
Copper	3
Tin	50
Antimony	7

The cost of this mixture will, of course, depend chiefly on the market price of tin.—J. L. J.

PLATING

Q.—What is platinic hydrate, and how is it prepared for a platinum plating bath?

A.—Platinic hydrate is a salt of platinum and is precipitated from its solution of chloride by the aid of a concentrated solution of caustic potash, dissolved in water. The pure article that comes in sticks should be used. Add the concentrated solution of potash carefully as long as a precipitate is obtained, then wash the filter in the usual manner. The Bright Platinum Plating Company of London, Enngland, use platinum hydrate in their platinum baths, so there is possibly nothing better for the purpose.

RECOVERING

Q.—What is the simplest and best method of extracting platinum from electric bulbs or lamps?

A.—To obtain the platinum from electric bulbs, break off the tips containing the platinum wire, using a pair of pliers, and remove the adhering glass by means of an iron mortar and pestle. The powdered glass may be washed away from the platinum by using an ordinary gold pan. Next place the wire in a porcelain dish and treat with nitric acid; to remove the copper wash well with water and then treat with hydrochloric acid. If the platinum is free from solder and copper wire it may be dissolved in aqua regia, the glass removed by filtration and the platinum recovered as platinum black.—J. L. J.

REFINING

Q.—Can you tell us the best method to clear the slag from a copper refinery, and what will be the ultimate loss?

A.—The slag from a copper refinery can best be worked up in a small water-jacketed cupola. The ultimate loss will depend on how much copper the slag from the cupola carries. If you can get it below 2% the slag can be thrown away, as it will scarcely pay to treat it further.—J. L. J.

SOLDERING

Q.—I wish to inquire if you can give me a mixture for aluminum solder and the method for soldering aluminum.

A.—We are unable to give you a successful aluminum solder or a method for soldering. We would advise you to correspond with our advertisers. A recently patented aluminum solder consists of 70 parts tin, 20 parts zinc and 2 parts of copper. A patented flux consists of 60 parts potassium chloride, 12 parts of salt, 20 parts of lithium chloride and 6 parts of cryolite.—C. H. P.

STRIPPING

Q.—Kindly let me know what acids to mix in order to take old nickle off of brass and leave it smooth, so that it can be buffed without being polished on an emery wheel?

A.—The proportions for nickel strip for brass is as follows:

Sulphuric Acid	4 parts.
Aqua Fortis	1 part.

Then add sufficient water to produce a quick action of the dip. The dip should be used warm. After using some time if the brass surface comes out rough, after stripping, add more sulphuric acid and very little aqua fortis. With very little care the surface will come out smooth and bright, and can be readily repolished on a buff wheel in the regular manner.—C. H. P.

PATENTS

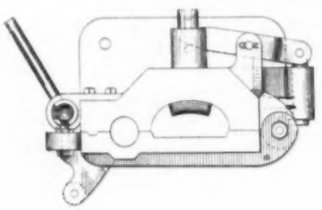
REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

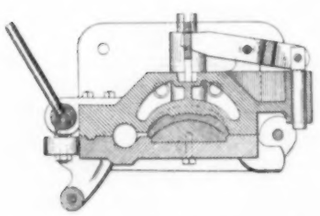
971,563. October 4, 1910. Flux for Brass Plating.—W. S. Rockey and H. Eldridge, New York, N. Y.

This invention covers a flux for use in plating single articles of iron, cast iron, malleable iron or steel with brass. The flux is prepared by boiling the water out of boracic acid by heating in a silver-lined iron crucible and then decomposing the remaining water by adding metallic zinc. The flux when used protects the surface of the metal to be brass plated from oxidization. The flux can be remelted and used on again. The same inventors have been granted another patent, No. 971,564, which covers the process of preparing a flux for use in providing a bath of copper or brass. The flux is prepared in practically the same manner with the exception that instead of using zinc for the final decomposition of the constitutional water, carbon, cadmium, antimony, bismuth or any of the water decomposing elements can be used.

974,530. November 1, 1910. Journal-Bearing Mold. H. F. Schroder, Berwyn, Ill., assignor to Wm. H. Miner, of Chicago, Ill.

The invention provides for a mold suitable for manufacturing the soft bearing metal shells or liners of journal bearings. The device shown in cut consists in combination with the opening and closing members of the mold, preferably hinged together and comprising a main or stationary member and a hinged or door member and movable core members for forming the tapering lubricant cavities in the liner or bearing shell cast therein,





of connecting means between the hinged member or door of the mold and the movable core members to automatically operate the movable core members to eject the soft metal bearing shell or liner from the mold by the opening of the door.

It further consists, in connection with the main and door members of the mold, of a rocking lock shaft on one of the members furnished with eccentric locking rims and coöperating adjustable locking rollers on the other member, adapted to enter and engage the slotted locking rims of the rock shaft on the first member to enable the two members of the mold to be snugly, firmly and securely locked together and readily opened and closed.

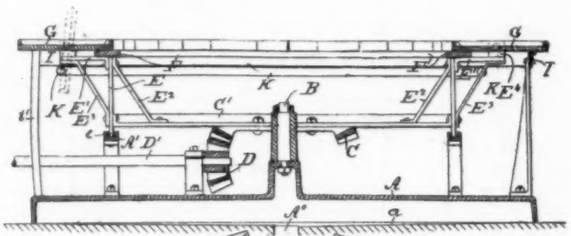
974,419. November 1, 1910. Process of Making Copper Alloys. J. Naulty and J. Scanlon, Philadelphia, Pa.

The invention relates to a process of making chromium alloys of copper, compounded with nickel and other metals, and to the new composition metal which is the product thereof, and has for its object to produce a copper alloy which is of great tensile strength and incidentally of sufficient hardness, approximately that of ordinary steel, to make edged tools therefrom; and is well adapted for rolling, welding and forge work.

In carrying out the process to produce the new alloy, from the elements and in the quantitative ratios stated, five pounds of chromium are melted in a crucible with five pounds of aluminum of commerce, used as a flux, and which, with natural draft, will occupy about one hour, whereupon one hundred and ten pounds of copper are added to the mass in the crucible and melted, under a continued application of the same heat for about thirty minutes; after which twenty-five pounds of nickel are placed in the crucible and which will combine with the other elements in a molten mass in about one hour; and finally twenty pounds of zinc are added, which melts almost instantaneously, and is employed principally for bulk or body purposes. Although the ratio stated of chromium to copper and of nickel to copper are approximate only and may be slightly varied, the order stated in which the elements are admixed in the crucible, and the employment of aluminum as a flux, with the chromium, are essential; and finally it must be understood that the new composition metal is essentially a copper alloy. It has a slightly reddish tinge, and tests of it, made from the formula above given, showed a tensile strength of 78,950 pounds.

974,541. November 1, 1910. Machine for Casting Anode Plates. R. Truswell, Trail, British Columbia, Canada.

The machine shown in cut is devised with the object of casting anode plates such as are used in electrolytic processes of refining metals and objects of a similar character made of soft metal, such as copper and lead. Referring to the cut, the machine operates as follows: The wheel C turning in the direction of the arrow, Fig. 1, with the arms C¹ turning in the direction of the arrow, Fig. 1, brackets E and plate F, forms a horizontal rotary table on which the open molds G are hung on trunnions,



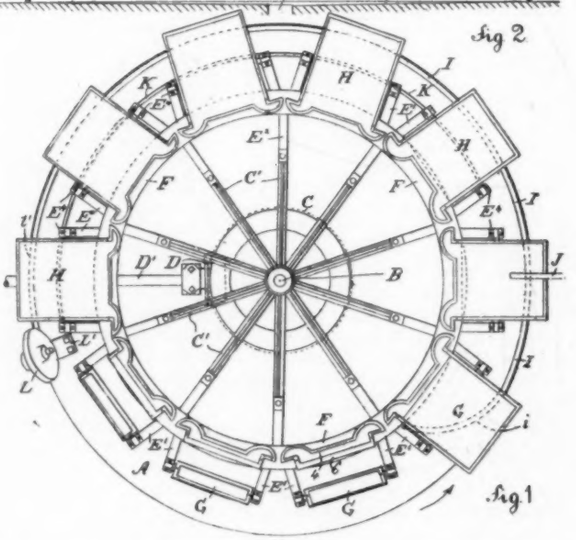


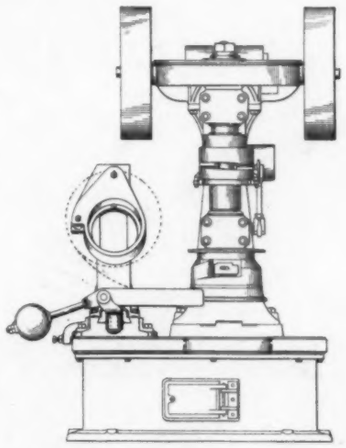
Fig 2

Fig 1

held flat and making joint with the fixed heads for filling by sliding upon a circular rail. This rail I, which by its curved end, *i*, first picks up the depending end of the mold, holds the latter flat and steady while passing under the filler J and until it reaches the tilting device *i*' and L. The filled mold, always in motion, moves on and passes over the spray pipe, the metal in it cooling and setting until it arrives at the point where the rail I dips. The mold is now free to tilt, upset and dump the casting, the pulley L assisting in the latter operation and thus the casting is removed. In tilting, the main part of the casting H lifts the head from the fixed head part of the mold. After upsetting, the mold remains suspended until the end *i* of the rail picks it up again and it is tilted up back into position ready for filling again.

974,723. November 1, 1910. Wire-Drawing Machine. H. E. Parry Taylor, Seymour, Conn., assignor to the Coe Brass Manufacturing Company, Torrington, Conn.

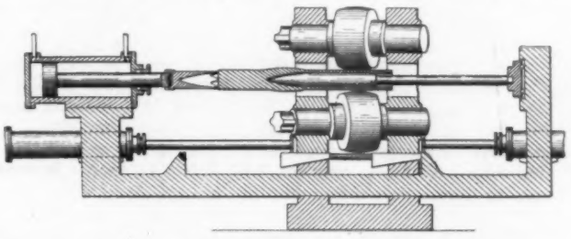
The object of this invention is to provide a machine for drawing wire which is of durable construction and simple arrangement of parts and which is adapted to be used for drawing wire of comparatively minute transverse dimensions up to rods of five-eighths of an inch in diameter or thereabout.



The machine shown in cut consists primarily of a rotating shaft from which a wire block is suspended and a simple and durable clutch mechanism for transmtiting movement to the said shaft. An effective means is provided for transmitting movement to a worm shaft through which motion is initially transmitted to the movable parts of the machine. A wire reel of special construction is provided. A shiftable plate is mounted upon the bed-plate of the machine and supports the wire reel above mentioned and a die holder.

974,744. November 1, 1910. Method of Manufacturing Seamless Tubes. Otto Briede Beurath, near Dusseldorf, Germany.

Heretofore, in reducing hollow billets to tubes, the billet was

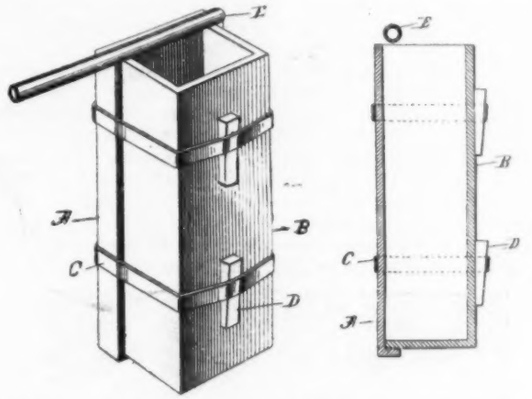


made of an internal diameter corresponding approximately to that desired in the finished tube, but the external diameter is made greater than that of the finished tube. And reduction is effected by subjecting the external surface of the billet to reducing surfaces of progressively reduced caliber. In other words, during reduction from billet to tube, the internal diameter of the former remains practically unchanged, while the external diameter is reduced.

The machine shown in cut has for its object the reduction of a hollow billet to tube form by increasing the internal diameter of the billet, without decreasing the external diameter of the finished tube materially beyond the original external diameter of the billet.

974,934. November 8, 1910. Method of Casting Metal. C. H. Upson, Waterbury, Conn.

This is a device designed to overcome the entraining of gases in a casting of brass, etc., during the process of cooling. In the regular mold as used in most shops, in casting the ingots or bars in these molds the heat of the molten metal causes the air



and gases to expand, and in so doing most of such air and gas will escape out and through the molten metal and top of the mold. Frequently, however, a part of such will remain in the metal, due to the fact that the volume thereof is so small that it is insufficient to force a passage through the metal, the pocketed or confined air and gas causing the formation of pin holes in the metal and necessitating in all instances the overhauling of the bars or castings in machines provided with scrapers or knives to remove the rough exterior surfaces thereof in order to determine the perfect and the imperfect bars.

It has been found by experiment that increasing the volume or supply of air to the molten metal while pouring the same into the mold overcomes all danger of the formation of these pin holes, the air being supplied under pressure from any suitable source, the increased volume thereof rendering it capable of forcing its way out through the soft metal and resulting in a solid, smooth and homogeneous casting.

The mold designed for this purpose and shown in cut consists of the two sections A—B held together in their proper relative positions by means of the metal bands or straps C, the latter being tightened by means of the wedges D, the top of said mold being open and the bottom thereof closed. Over the open top of the mold is located the pipe E connected with any suitable source of air under pressure, that portion of the pipe extending over and above the mold being perforated in order to deliver the air into the mold as the metal is poured therein.

975,386. November 8, 1910. Method of Producing Metallic Articles by Electro Deposition. F. T. Gibbs, of Birmingham, England.

An improved method of producing many kinds of metallic articles by electro deposition on glass or potteryware models, or on models of other non-metallic substances, such, for instance, as ivory, celluloid, hard wood, tortoise-shell, vulcanite and jet, onto the surfaces of which, when properly prepared, metals can be deposited and from which the deposit forming the required metal article is afterward removed.

The invention is applicable to all those metal articles which have a rim or edge, such, for instance, as tea pots, coffee pots, jugs, cups, plates, dishes and all kinds of hollow-ware articles and to candlesticks, vases and the like.

The object of this invention is to form the electro-deposited metal article with a rounded channel section or inclosed edge or rim of double thickness of metal which will be smooth and form a properly finished rim or edge to the article.

INDUSTRIAL

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

A NEW RADIATION PYROMETER.

A new type of radiation pyrometer embracing several new and advantageous features has recently been devised by Richard P. Brown, of Philadelphia. There has been a long felt want for an accurate and simple pyrometer for use in measuring temperatures beyond the limit of the well-known electric pyrometer with platinum thermo-couple. This latter instrument is exceedingly useful for temperatures as high as 2500 degs. Fahr., but above this point the life of the thermo-couple is very short and its accuracy seriously impaired.

In the case of the radiation pyrometer the sensitive thermo-couple is located at the rear end of the tube or telescope, and a concave mirror focuses the heat rays entering the tube on the thermo-couple, which is connected by wire to the millivoltmeter graduated in temperature degrees. The radiation pyrometer, therefore, has no part directly subjected to the high heat to be measured, and there is, in consequence, no part to be destroyed by the furnace gases or high temperature. The radiation pyrometer has also the advantage of the readings being instantaneous, the slightest changes in temperature being shown immediately.

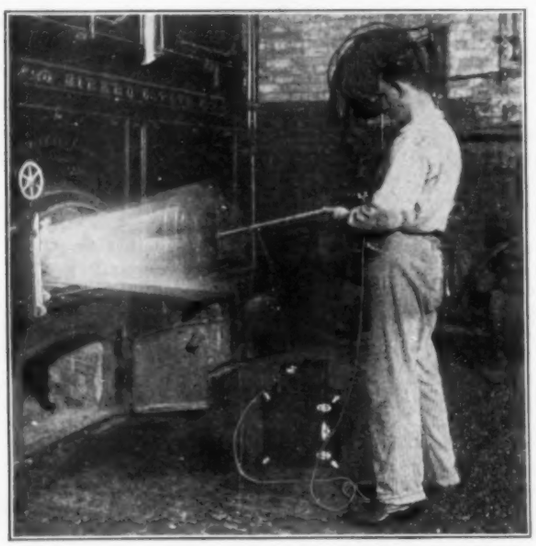


FIG. 1.—TAKING THE TEMPERATURE OF A BATTERY OF FURNACES WITH THE BROWN PYROMETER.

Radiation pyrometers heretofore manufactured have been of two types, the adjustable focus and the fixed focus. The imported type of radiation pyrometers using an adjustable focus have been too complicated for general use, and the fixed focus instruments have had no means by which the operator could tell whether or not the telescope was too far from the furnace opening or heated body. In the radiation pyrometer with fixed focus, to secure a correct reading of the temperature, the pyrometer tube or telescope should not be more than 30 ins. distant when the furnace opening is 3 ins. in diameter, or 60 ins. distant when the door of the furnace is 6 ins. in diameter; in other words, the pyrometer telescope or tube should not be distant more than ten times the diameter of the furnace opening or piece of steel the temperature of which is being measured. As long as the pyrometer tube was within these distances the temperature could be read correctly, but to determine this the distance had to be measured. There has also been no means heretofore with a fixed focus radiation pyrometer of being assured that the tube or telescope was pointed correctly at the furnace opening.

In the new Brown radiation pyrometer with fixed focus a finder somewhat similar to those used on kodaks has been placed on the tube, and by means of this the tube can be readily pointed directly at the furnace opening. It also acts as a measure of distance, and it is only necessary that the bright red of the furnace opening takes up the whole view in the finder. If some of the dark outside wall of the furnace is showing around the bright red opening, the tube is too far distant and should be moved closer until the bright red only is showing. It is impossible for errors to occur with this new feature, and the instrument is accurate under ordinary working conditions within 1 per cent. or 30 degs. at 3000 degs. Fahr.

The instrument is calibrated for measuring the temperature of a black body, or the temperature of the walls or parts inside of furnaces which are practically black bodies. In using the pyrometer for measuring the temperature of molten metals or highly polished surfaces which reflect, a correction is made. Another new and particularly desirable feature of the Brown radiation pyrometer is in the collapsible tube made like a telescope, which permits of the pyrometer tube, indicator, tripod and wiring being fitted in a small leather carrying case weighing complete only 15 lbs., as shown in Fig. 3. This feature is particularly desirable to engineers and superintendents, who may have to take the pyrometer from one point to another occasionally for tests. In using a radiation pyrometer focused on a brick kiln or furnace, it is frequently inconvenient, if tests of long duration are to be made, to leave the door or opening open. A fire brick tube is therefore inserted in the opening, and projects into the kilns or furnace, the inside end of the tube being closed. The pyrometer telescope is focused on the inner end of the fire brick tube, and for permanent installation a bracket is used instead of the tripod to bolt on the wall and hold the pyrometer tube.

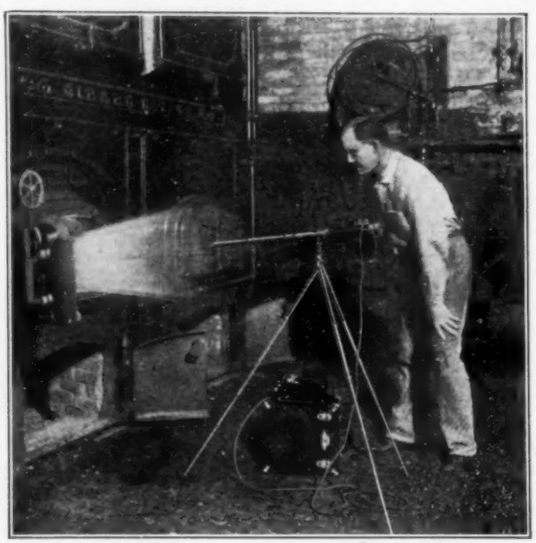


FIG. 2.—THE PYROMETER MOUNTED ON A TRIPOD FOR PROLONGED USE IN ONE LOCATION.

The instrument will be adaptable particularly for measuring the temperatures about a blast furnace plant, in the open hearth furnaces of steel or other metal melting works, where excessive temperatures are carried, in brick kilns for burning firebrick and very refractory materials, in rotary cement kilns where the temperature is running about 3,000 degs., and must be measured 20 ft. inside the furnace, and by engineers in testing the temperature

of boiler furnaces, and in research work. In fact, there are any number of operations where high temperatures are carried and must be measured where this instrument will prove particularly adaptable.

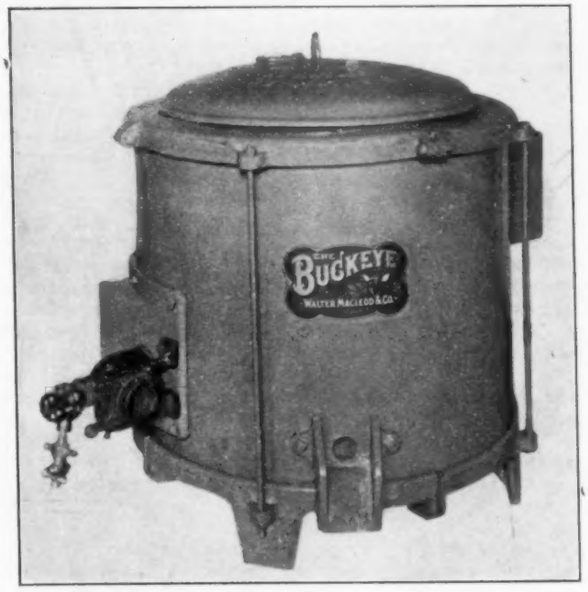
This new radiation pyrometer is being placed on the market by the Brown Instrument Company of Philadelphia, with

FIG. 3.—THE NEW RADIATION PYROMETER MADE BY THE BROWN INSTRUMENT COMPANY, PHILADELPHIA, PA.

offices in Pittsburg and Chicago, and patents have been applied for covering the advantageous features embraced in this instrument.

THE BUCKEYE BRASS MELTING FURNACE.

The furnace is designed for the use of oil or gas fuel, although the photograph shows an oil burner, which was specified in this instance, as the oil fuel was much cheaper than the kind of gas



BUCKEYE BRASS MELTING FURNACE.

available. The design of the furnace permitting the crucible lifting out in the usual manner is cylindrical in form with the burner set at an angle, forcing the flame around the crucible, heating it and its contents by radiation, thus protecting the crucible as well as insuring uniform and economic heating.

The furnace consists of a sectional cast-iron bedplate and legs, sheet iron riveted shell, a sectional cast iron top plate, all securely held in position by tie rods connecting bed and top plate; lined with 4½-inch wall of the best grade of standard shaped firebrick, and fitted with cast iron sliding cover, tap hole and spout, and burner, ready for connecting burner to air and oil supply piping. The sectional bed and top plates bolted together permit expansion without cracking. The tap hole and spout are provided as a means of emptying the furnace readily in case of the crucible breaking. The oil burner, which is fitted with stop cock and needle valve for control of oil and blast gate for air, requires an air pressure of only 8 ounces, furnished by a fan blast pressure type of blower, to produce a soft uniform heat of any desired temperature.

Standard sizes of crucibles up to No. 125 may be used in this furnace. The number of heats per day and cost of fuel per cwt. of metal melted depends upon the kind of metal largely, but considering the cost of fuel equal to that of coal or coke, the general advantages of positive control of temperature at all times, maximum number of heats per day, saving of waste metal from the ashes, and the cost of recovering, are considered sufficient to warrant its use. The cost of a furnace and equipment of this nature with the certainty of results, due to proper conditions, etc., has led the makers to believe there will be a demand for an equipment including furnace, blower, pump and oil tank, with proper instructions for setting up and operating, and they are prepared to sell equipments as low as $280.00 net, f. o. b. cars Cincinnati.

The furnace is manufactured and sold by Walter Macleod & Company, of Cincinnati, Ohio.

HOUGH'S DRYER FOR METAL GOODS.

A machine for drying out small metal goods after plating, that though new, is used extensively in manufacturing jewelry and metal goods shops in Providence, R. I., and vicinity, is Hough's centrifugal dryer, manufactured by the Estate of A. O. Kellogg, 250 Eddy street, Providence, R. I.

The apparatus shown in cut consists of a steam coil encased in a copper jacket, which is sheathed with asbestos and galvanized iron, to prevent loss of heat. Inside the jacket is a vertical shaft which supports the crab, on which a basket, full of the articles to be dried, is placed. This basket is 10 ins. in diameter, with sides made of heavy copper wire, and bottom perforated or plain, as desired. The bottom of the basket is cone-shaped. The shaft is fitted with double idler pulleys and a drive pulley, which takes a 1-in. belt. The shaft and the basket which it supports revolve at 750 revolutions per minute. Proper steam connection is provided, and there is an intake in the jacket through which air is drawn, and this air, after being heated by the steam coil, is forced through perforations in the inner jacket down on the articles in the rapidly revolving basket, and rapidly dries them. The basket holds a peck of small articles, and dries the most difficult kinds in three minutes while ordinary work is dried in from one to one and one-half minutes.

HOUGH DRYER FOR METAL GOODS.

The manufacturers claim a number of exclusive features for this machine, that make it very satisfactory to use. The machine occupies only small floor space, not over one-half that required by the ordinary sawdust box. Being constructed of copper, the basket resists the action of acids with which it may be brought in contact. Under the steam coil is a baffle plate which distributes the air evenly over the coil, and this insures uniform heating. This machine has already been installed in many well-known Providence shops, including those of B. A. Ballou & Co., who have five machines; T. E. Bennett Company, four machines; Silverman Brothers, two machines; Whiteman & Huff, three machines; Park Brothers & Rogers, four machines.

A MODEL PLATING AND POLISHING ROOM.

A large separator with its accompanying pipes, shown in the cut, was recently installed at the Dayton Plating & Manufacturing Company, Dayton, Ohio, by Kirk & Blum, manufacturers of dust saving apparatus of Cincinnati, Ohio. The height of the separator is 13 ft., with a diameter of 10 ft., and the pipe leading to it is 20 ins. in diameter. This separator is located on the roof of the building, where dust laden air from the polishing and buffing machinery is collected, and the dust is separated and deposited in a receptacle, allowing only the pure air to escape to the atmosphere.

DUST SEPARATOR ON ROOF OF DAYTON MANUFACTURING COMPANY.

The picture in Fig. 2 shows the polishing room of this company, which is equipped with the economical adjustable hood, also manufactured and installed by Kirk & Blum. The Dayton Plating & Manufacturing Company has built up one of the largest and most modern and completely equipped metal plating and finishing plants in the country, and enjoys a large trade, both

VIEW OF POLISHING ROOM, DAYTON MANUFACTURING COMPANY.

from the factories, shops and jewelers of Dayton, as well as from out-of-town. The work of this company is of great variety, turning out enormous quantities of nickel, brass and copper plating, and a great amount of electric galvanizing, which is applied to articles requiring weatherproofing; also, all descriptions of gold and silver plating, lacquering, etc.

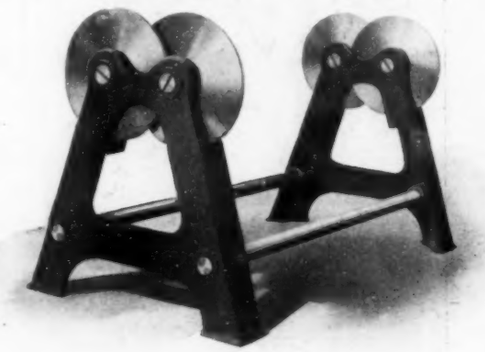
THE TWENTIETH CENTURY BALANCING TOOL.

What is claimed to be the most practical tool ever gotten up for the purpose of balancing pulleys, cones, armatures, polishing wheels, etc., is shown in the cut.

It needs no leveling or adjustment, and is always ready for use, no matter where or how it may be placed. The rotating discs are hardened and ground, the pivots run in ball bearings, which makes this tool more sensitive than any other device on the market.

The machine is made in two sizes as follows:

No. 1. Which is intended to set on the bench, and will balance a pulley up to 22 inches in diameter. Greatest distance between standards, 20 inches. Weight, 30 lbs. Price, $20.



TWENTIETH CENTURY BALANCING TOOL.

No. 2. Adapted to stand on the floor. Greatest distance between standards, 30 inches. Will balance any work up to 42 inches in diameter. Weight, 80 lbs. Price, $25.

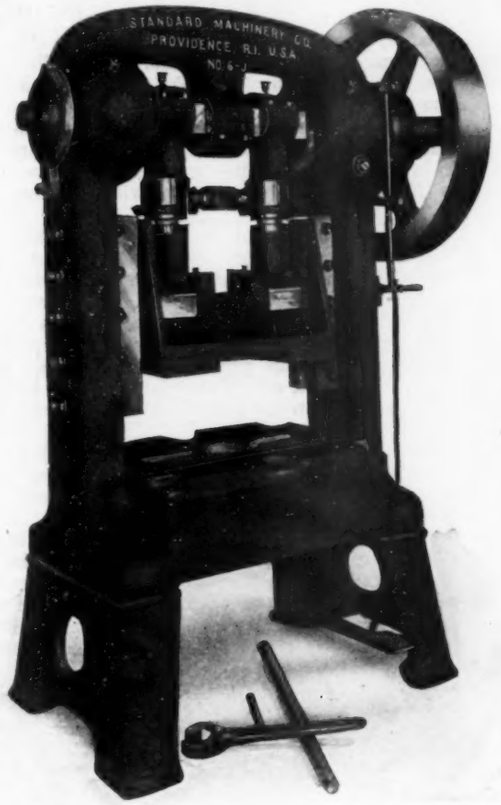
This machine is manufactured by The Hanson Van Winkle Company of Newark, N. J., who will gladly answer all inquiries regarding same.

NEW LINE OF DOUBLE CRANK PRESSES.

This line of presses is known as the double crank "J" press and is manufactured by the Standard Machinery Company, Providence, R. I. The machine shown in cut is a modification of the regular line of "J" presses and fitted with some of the regular attachments. The new features are the method of adjusting both connections with one wrench and the extra heavy and rigid lines of design and the construction of the ram, boxes and shaft bearings. The machine is fitted with the instantaneous Horton roller friction clutch, allowing less than 1-32 inch travel of the periphery of the wheel after it is engaged. The driving wheel on the plain press is 60 ins. diameter and weighs a ton in the rim, whereas on the back geared press it is 42 ins. diameter and weighs 1,400 pounds. The slide of the machine is made extra wide to accommodate blanking dies of a large area. The thrust blocks in the ram are of bronze, whereas the connections are of high-grade iron and steel. A new feature is the adjusting of these two connections simultaneously by means of bevel gearing; over the adjusting screw which connects the upper connection to the lower slides the large bevel gear. This is a sliding fit with a keyway in the gear and also in the screw. It also has running fit in the recess of the bearing connection, which is prevented from turning or binding by the pinion shaft. This enables the bevel gear to have the screw travel up and down and secure the adjustment on either side, whereas it remains stationary as far as raising and lowering are concerned.

Another neat feature of the adjustment is the method of placing the pinions on the connection shaft. This is made by the telescope method by inserting one end of the shaft into another and putting a square clamping device which is square on the outside. It is broached square on the inside, preventing any chance of slippage or torsion and also giving it a great amount of bearing surface for twisting. The above method allows the adjustment of the ram with comparative ease and a man can adjust it with a 14-inch wrench; in the bottom of the wrench there is a 3⅜-inch opening to go over the pinion shaft and square clamp. The ram without any attachments, dies or boxes weighs 1,000 pounds; and with boxes, lower connection attachments, etc., it will weigh between 1,800 and 2,200 pounds. Although the weight is considerable to be lifted with the above ratios a man can do it with comparative ease by using the wrench mentioned above.

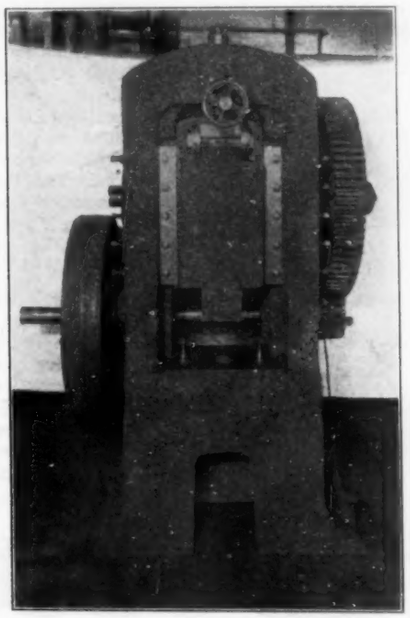
The dimensions of the machine, which is made both geared and plain, are given below as follows:



DOUBLE CRANK "J" PRESS. STANDARD MACHINERY COMPANY.

NO. 6-J SINGLE ACTING PRESS.

Distance between uprights	44 ins.
Overall height	112 "
Wheel	60 x 7 "
Weight of wheel	2,000 pounds
When geared, ratio	8-1
Wheel when geared	42 x 7
Distance front to back on bed	28 ins.
Right to left	52 "
Ram to bed, stroke down	13 "
Stroke	3 "
Adjustment	2½ "
Floor space, front to back	60 "
Floor space, right to left	75 "
Size of bottom of slide	30 x 15 "



TOGGLE EMBOSSING PRESS.

Section through upright	11 x 6 "
Maximum hole in bed	24 x 10 "
Thickness of bolster	3 "
Net weight—plain	11,500 pounds
Net weight, geared	13,500 "

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN BRASS FOUNDERS' ASSOCIATION.

President, N. K. B. Patch, Toronto, Canada; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 1155 Sycamore street, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held in Pittsburgh, Pa., May 23-26, 1911.

Bulletin number three, issued in November by this association, gives the names of three new members just admitted as follows:

Empire Smelting Company, C. A. Finnegan, Depew, N. Y.

John Smith, 454 S. Massey street, Watertown, N. Y. Dr. Bradley Stoughton, 165 Broadway, New York, N. Y.

The meeting of the executive committee was held in Buffalo October 14, 1910, at which were present President N. K. B. Patch, Secretary W. M. Corse, Senior Vice-President L. W. Olson, Vice-Presidents W. L. Abate, W. H. Carpenter and Thomas Evans.

The report of the secretary showed the membership to be 275, of which 227 members were paid in full, 48 in arrears. Thirty-nine members have signified their intention to buy a bound volume of the transactions. The treasurer's report showed the association to be in a good condition, and if the year was as prosperous as it started out, will show a balance as usual. It was decided to publish the abstracts in the various bulletins, rather than hold the bound volume open until the end of the year for this material.

A motion was made and carried to concur with the American Foundrymen's Association in their meeting at Pittsburg, May 23-26. Numerous plans for increasing the membership of the association were talked over, and it was decided to print 1,000 extra copies of Dr. Stephenson's paper

on "The Value of the Association to Its Members" for distribution among those who might be interested. In order to get a more complete membership list, the secretary has sent out cards, which when properly filled out, will give him information as to the positions occupied by the various members, together with their firm's address. If you have not already filled out this card, kindly do so at once.

NATIONAL ELECTROPLATERS' ASSOCIATION OF THE UNITED STATES AND CANADA.

President, Charles H. Proctor, Arlington, N. J.; Treasurer, H. H. Reama, New York, N. Y.; Corresponding and Financial Secretary, Geo. B. Hogaboom; Recording Secretary, Royal F. Clark. All correspondence should be addressed to the Corresponding Secretary, Geo. B. Hogaboom, 656 Hunterdon St., Newark, N. J. The objects of the Association are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23d St., on the fourth Friday of each month, 8 p. m.

The twenty-first regular meeting of the association was held Association was held on Friday evening, November 25, 1910, in its meeting room in the Grand Opera House Building. There were twenty-five members present. Four active and two associate members were elected. The charter committee reported progress upon the Philadelphia branch charter. Six members were placed in positions by the employment bureau during the last three months. The report of the financial secretary for the past six months was read and approved on motion. It was decided that the association present to all out of town members, or those who are beyond commuting distance from New York, a button of the N. E. P. A.

Hugh Baxter read an article upon the electric cleaner, while Messrs. Proctor, Stremel, Bannard and Clark spoke upon electric cleaning solutions and their manipulation. R. H. Sliter read an article upon the production of the Pullman bronze finish, also papers upon a polished green oxidize on brass and a matt green oxidize finish on brass. William Voss read a paper upon artificial illumination in the plating room. C. H. Buchanan presented a paper, which was very ably written, entitled Nickel Anodes. The discussion for the December meeting will be upon various subjects.

The third regular meeting of the Philadelphia branch of the National Electro-Platers' Association was held at Dooner's Hotel, 23 South Tenth street, Friday evening, November 25, with the president, Fred Clement, in the chair. There were sixteen members present and a very enthusiastic meeting was held. One new member was admitted into the association. As an evidence of the interest taken in the new association William Buckley, of Wilmington, Delaware, comes twenty-eight miles every meeting night. The same interest is taken by every member on all questions.

The president read an article on acid copper plating one side of No. 22 spinning iron and the method of annealing when the copper plate was the same thickness as the iron itself, showing samples of work done. A general discussion on the subject followed. Hugo Hermanns showed samples of black lacquering done by the use of sprayer, which was very interesting to all. August Heck, of the Mullen Lock Company, showed samples of barrel plating, of which he will speak at some future meeting. At the next meeting Hugo Hermanns will speak of acid copper plating, also Arthur Wells will speak and give a demonstration of silver plating the inside of hollow ware.

ITEMS OF INTEREST TO THE INDIVIDUAL.

William B. Stadtfeld has been appointed by the Selby Smelting and Lead Company, San Francisco, California, to the position of manager of the sales department, succeeding John B. Chace, who recently resigned.

John Caley has severed his connection with the Plume & Atwood Rolling Mills Company, Thomaston, Conn., to accept a position with the Ontario Brass Rolling Mills Company at New Toronto, Ontario, Canada.

J. E. Horn, formerly with the Manufacturers' Supply House, Erie, Pa., has accepted a position with the Chicago Pneumatic Tool Company, Chicago, Ill., where he is installing a new system of cost keeping and a new method of keeping a daily inventory.

H. C. Bernard, formerly foreman plater with the Bommer Brothers, bolt, nut and screw manufacturers of Brooklyn, N. Y., has taken a similar position with John Hassall, Inc., manufacturer of rivets, escutcheon pins, and special wire nails, Clay and Oakland streets, Brooklyn, N. Y.

Eugene Noble Foss, who was on November 8th elected Governor of Massachusetts, is known to many in the metal business as the president of the B. F. Sturtevant Company, Hyde Park, Mass., builders of exhaust apparatus for metal shops and other industries.

Ferdinand Deming, whom we mentioned in the October number of THE METAL INDUSTRY was negotiating with an English mill with a view of becoming its superintendent, has accepted a position with the Kingston Metal Company, of Birmingham, England, and sailed from New York Oct. 27 on the steamer *Amerika*.

G. H. Chandler has become associated with the Levett Manufacturing Company, 407 Canal street, New York, manufacturers, importers and exporters of nickel platers' supplies and polishing materials, electric dynamos and motors, in the capacity of representative and will have the following cities as his territory: New York, Brooklyn, Jersey City, Hoboken, Elizabethport and Tarrytown.

W. D. Martin paid a recent visit to Waterbury, Conn., calling on his former business associates. As mentioned in THE METAL INDUSTRY at the time the change was made, Mr. Martin was changed from the Waterbury Brass Goods Corporation to the Chicago Brass Company at Kenosha, Wis., in the buying and selling departments. Both plants are controlled by the American Brass Company. H. B. Pendleton took Mr. Martin's place.

M. F. Legge, formerly with Zucker & Levett & Loeb Company, New York, and the Apothecaries Hall Company, Waterbury, Conn., is now representing James H. Rhodes & Company, importers and manufacturers of industrial chemicals, 2 Cedar street, New York, throughout New England. This company is putting out a full line of platers' and polishers' supplies and is in a position to quote satisfactory prices on them. They have factories at Brooklyn, N. Y., Pittsburg, Pa., and Hartford, W. Va.

Paul Koning, president of the New York Metal Exchange, has resigned that office, as he is about to leave this country to become European representative of an important Americal metal interest. Mr. Koning was also the resident partner in this country of the firm of Brandeis, Goldschmidt & Co., London, England. James E. Pope, president of the Pope Metals Company, and vice-president of the Exchange, will probably be Mr. Koning's successor to the presidency of the Metal Exchange.

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

DEC. 5, 1910.

The lethargy that is so much complained of in business circles is found here in but a slight degree, for in the factories of the Naugatuck valley there is comparatively little idleness beyond the usual normal pauses in some line of work at this season. In some of the shops on the other hand there is plenty of bustle and the normal complement of help, as a rule, are busy on full time or nearly full time, in all lines of metal making and finishing.

The big plants of the Chase interests, Chase Rolling Mills and Waterbury Manufacturing Companies, are working hard and with hardly any noticeable slackening of speed except in those departments where there is always a slow down in December. The Chase rolling mills have been very busy all fall, with hardly a let up in the clip set when fall began. At the Scovill Manufacturing Company's plant conditions are about normal and most of the force of over 4,000 hands is kept busy on full time. It is reported that there is a slight falling off in the production and in business in the factory of the International Silver Company here, the Rogers spoon shop, which is not clearly understood, but at most it is interpreted as an indication of conservative management rather than a bad symptom of the future. Randolph-Clowes Company's plant is busy, but at the big American Brass Company's plant, known as Benedict & Burnham's, there is a noticeable slackening in most departments, except the fire and tube mills. The latter are still busy with a big government order, referred to in the previous month's letter. All the local wire mills are running practically full speed, which is considered by the hard-headed mechanics of this section a good indication of healthy industrial conditions generally.

There is a busy shop in Waterville, that of the Blake & Johnson Company, which has seemed to go forward in some directions with great strides since its establishment in the suburbs in its fine new plant. Perhaps one of the explanations of this increased activity is its ambition to develop its screw business in all directions. It has recently added to its force of experts a former Scovill employee, who resigned from Scovill's to go to Bridgeport and was brought back to Waterbury by General Manager, Robert P. Lewis, of the Blake & Johnson Company. It is understood that he is one of the shrewdest screw men of the country and has secured patents on several devices of his own invention which are important features of the present methods of screw manufacturing. There seems to be plenty of business in the watch and clock lines, for the New England Watch Company is going well and has a fine outlook, it is reported. The Waterbury Clock Company has been kept busy on short orders and rush business on holiday goods, but has a goodly supply of general orders to keep all hands in most departments busy. The Bannatyne Company is busy and in the smaller shops conditions are satisfactory on the whole.

The Scovill copper theft cases which surprised the whole Naugatuck valley early in November, are still brought before the limelight on account of the trial of continued cases in the courts. Most of the workmen's cases have been disposed of, fines and jail sentences having been dealt out, but the end is not yet. In the near future, it is believed, there may be some surprises in several other large factories hereabouts. The manufacturers have taken up the lead of the Scovill Company and are looking deeply into their stock accounts and there has been considerable industrious probing, both by officials and detectives, into numerous suspicious circumstances for over a month. The junk dealers' cases, which were appealed to the district court, are just beginning to be heard and it is common to see the court room strewn with all kinds of metal, which is held as evidence, having been seized, some of it in the railroad yards when about to be shipped out of town, by the police.

THE METAL INDUSTRY's announcement of the Waterbury Crucible Company's plans to leave the city, which brought forth a spicy interview from the general manager of that company as to the attitude of some local manufacturers towards plants of its nature and their preference for outside products, caused a good deal of a stir in manufacturing circles and some communications airing views pro and con were produced in the local press, but the matter seems now to have been dropped. Many have expressed regret that the Crucible company, which has a splendid record here financially and for its products, should see fit to quit the field, and all who are familiar with the company's business have little doubt of its success in the larger western city. It has the enviable record of coming to the city with money enough to buy its plant and meet its obligations and to conduct its business during the entire period without having to borrow a dollar.—F. F. B.

CORRECTION.

In the Waterbury correspondence of our July issue, 1910, we stated that the Whiting Manufacturing Company of Bridgeport, Conn., was having difficulty in securing skilled factory hands since it had moved its factory from New York to Bridgeport, many of its employees preferring to remain in the metropolis, and that as a consequence it was understood here that the company faced a large financial loss.

THE METAL INDUSTRY has since been informed by the Whiting Manufacturing Company that the above statement was incorrect, they not having difficulty in securing skilled employees, nor as a result had they suffered any financial loss.

THE METAL INDUSTRY is glad to hear this, for it wishes the Whiting Manufacturing Company and all other metal manufacturers every success and freedom from labor troubles.

PROVIDENCE, R. I.

December 5, 1910.

The year 1910 will close in a busy whirl on the part of the manufacturing jewelers of this city and vicinity. As a whole the year has been a satisfactory one and the prospects of the coming year are very encouraging. During practically the entire year the majority of the factories have been comfortably busy, so that, while there has been less working overtime, there has been generally full time. The last two to four weeks have experienced some overtime. But this is over and regular conditions now prevail.

When the announcements began to come in from the elections throughout the country, indicating changes in the complexion of the incoming Congress, fears were expressed for the future of the jewelry industry, because of the talk of tariff revisions that permeated the political atmosphere. It is not believed, however, that any radical changes will be made, if any, and the manufacturers of the East are preparing for an even better business the next spring than last.

At the annual election of officers of the New England Manufacturing Jewelers' and Silversmiths' Association provision was made, however, to meet any such contingency as a tariff change, should it arise, and a permanent committee on tariff has been appointed to watch for any such exigency. The members of this committee are men who have much experience in this very line of work, and who, through their knowledge of the ropes, are expected to afford ample protection against any deleterious results.

An indication that the coming spring is to be a good one for the jewelers is seen in the invasion that the firms of the middle and western sections of the country have made upon New England. The first of the month saw this influx at its height when not less than forty of the leading jobbing and wholesale houses of the country were represented at the hotels in this city. The two leading hotels of the city resembled large salesrooms, and more than a hundred manu-

facturers and their traveling representatives were to be seen thronging the lobbies ready to show their goods. Orders were generally of good proportions and the aggregate is said to far surpass that of any spring buying ever known here.

Walter S. Williams, for many years a partner in the firm of Barstow & Williams, manufacturing jewelers, has recently purchased an interest in the New England Ventilating and Heating Company of this city, and has been made treasurer of the concern.

C. R. Norton & Company, manufacturing jewelers, have removed to new and larger quarters at 44 Borden street. They were formerly at 86 Page street.

George S Sawyer Jr., has purchased the interest of John S. Poyen in the Electric Chain Company, Attleboro, and with this change the following board of officers has been elected: President, Thomas S. Bennett; Vice-President, A. S. Rees; Secretary and Treasurer, George F. Sawyer. This concern manufactures large quantities of fine chain by machinery.

The Providence Metal Spinning Company has been doing a very successful business during the last few months. One of its orders was for 500 reflectors for the Baird-North Company, manufacturing jewelers, who has adopted the new system of lighting its extensive factory plant by the reflex plan.

Announcements have been sent throughout the trade of a change in the firm of J. W. Luther & Company, of Attleboro, the oldest pearl concern in New England. The firm has been absorbed by the Essex Pearl Button Company of Arlington, N. J., and the Attleboro plant with all its machinery and equipment is to be moved to that place in the near future.

A fire was attended by considerable water damage early on the morning of the 14th in Slater avenue, Pawtucket There was no general call for the firemen. It was in the City Brass Foundry, at the foot of Slater avenue and was discovered when the foundry was opened in the morning. A spark had found its way from the furnace into some sheathing over a beam not far from the roof. The fire had a good start, but prompt action extinguished the flames.

Gas getting in the tin blow pipes at the Riley & French building, North Attleboro, caused considerable excitement in the four factories located there on the morning of the 16th, and put a stop to operations for the day. The explosion caused much noise and badly frightened all in the building. The firms affected were C. A. Randall & Company, Cheever, Hudson & Company, W. & S. Blackinton & Company and Riley & French. About 800 persons are employed in the entire building.—W. H. M.

BRIDGEPORT, CONN.

December 5, 1910.

Every one of the metal trades plants in town have been doing record business for many weeks, and the pre-holiday let-up is but just beginning to be felt. This has been particularly true of the Holmes & Edwards Silver Company, Weidlich Brothers Company, Handy & Harman, Jennings Brothers Company, Challenge Corporation and Smith's Silver Company. Some of these ran day and night gangs through November, and into December. Automobile accessory factories have not felt the usual winter falling off as much as formerly. The trade seems to be finding its level, and acute high and low pressure stages of the business are gone for good we hope. Purchasers of these commodities appear to have become an all-the-year-round factor, and to the everlasting gratification of a large number of the other trades.

A year ago, the demand for mechanics in the automobile and accessory factories, stirred up such a violent commotion in the labor market that a disastrous upheaval appeared to be imminent on questions of wages, hours and shop conditions. During the summer quite a number of the restless ones who fled to Detroit in response to the flattering inducements offered ,began to return, bringing with them almost an equal number of mid-west mechanics, who came here for the first time, chiefly on the strength of the word picture of the Easterner who brought him. Today the industrial atmosphere of Bridgeport is perfectly serene, very few of the skilled operatives are without work, and the prospects for the balance of the winter are encouraging for both employer and employed.

Without any thought of paternalism or welfare work, the Manufacturers' Association stumbled into a regular gold mine of good feeling last month. The Association had brought its members together for a monthly dinner, for about three years, with speakers on subjects of interest or instruction to the factory executive. It had served the deeper purpose of knitting together socially and industrially, one of the strongest organizations of its kind in the country. For the November dinner, it had been announced that an Association member would relate his personal experience with the Emerson efficiency system, having had it in operation in his plant for about a year. A few requested the privilege of inviting their foremen. Then it was generally announced that it would be called a Foremen's Dinner. They came in droves. The talk interested them. The dinner was good and substantial and without frills. They asked pertinent questions of the speaker. Then they went home and everybody thought that was the end of it. Not so, however. Next morning foremen were exchanging comment on the dinner, the talk and more than all, the spirit of the thing. One executive who invited his entire force of foremen, fifteen in all to be present related a few days later that during his morning tour of the plant the next day the atmosphere had seemed to change, so different was the aspect of the situation. There was a strikingly marked increase of interest and activity, and healthiest of all, he was made to understand without being told in so many words, that his force appreciated being taken into the factory "family" socially and as a matter of good business intercourse.

Building activities have been suspended for the winter. Plans for further factory extensions are talked of but definite announcements will not be forthcoming until later.—B. G.

NEWARK, N. J.

December 5, 1910.

This is the busiest season of the year for the manufacturing jewelers, silversmiths and all other allied trades. This year is no exception to the rule, as the factories are all working at capacity, as a general thing. The 14 karat and better lines have shown considerable improvement. The diamond and platinum goods are in pretty fair request, although some say the demand is not as good as three years ago. This is a platinum year, and this metal, which has made rapid advances in price during the past year, is now used a great deal for backing, and where gold was used before, platinum is preferred. Platinum shows off the diamonds the best, is stronger and there is less waste than there is to gold in working up, and in the end does not cost much more. It gives better satisfaction for mounting work. The silver novelty line is selling well now and the silver workers are all busy filling orders for the holidays. This month will be a busy one all around. This line is growing here each year and is showing a great improvement. The many concerns making metal novelties out of brass, aluminum, bronze, etc. are busy, and the demand for these articles has been good. These lines have always been on a strong footing in this city and a very large business is done. These goods find a ready sale in all parts of the country.

William A. Leddell has started a new concern in the Strobell and Crane building called the Finished Parts Manufacturing Company, die casting under high pressure, no machine work being done in them. They can cast anything from this Sampson metal, which is 80 per cent. zinc, tin and antimony.

The J. F. Curry Manufacturing Company has been incorporated on Mulberry street near Green, to manufacture carriage, wagon and automobile parts of brass, bronze, etc., with a capital of $50,000. The incorporators are Joseph F. Curry, 58 Stevens street, Belleville, N. J.; Peter Nothnagel, 134 Magazine street, Newark; William Koeing, 419 Grove street, Irvington. This firm have made additions to their plating plant and do nickel and silver plating.

The Messner Jewelry Company is a new firm in the Richardson building and are making gold plated link and scarf pins.

John B. Morehouse has sold his nickel and silver plating business at 48 Lawrence street. The business will be conducted under the same name as formerly, with H. F. Van Sickle president and in charge of the business.

Mr. Morehouse has also sold his interest in the Newark Plate Engraving Company at 45 Lawrence street, to his associates. H. F. Van Sickle is also at the head of this firm.

The Harvey Osborn Silver Company, who were in a bad fire at the Shiman-Miller building, are still doing business there and will remain at that address. Business is good with them and they sell to jobbers.

William Schimper & Company, whose silver goods factory is in Hoboken, are reporting an extra good demand for sterling lines.

Ben Harris, who writes songs and used to live in Salt Lake City, Utah, bought the interest of Mr. Huber in the firm of Huber & Weisgerber, making 14 karat gold goods at 112 Arlington street. The factory has been changed around considerably, put in enameling and polishing departments and refine all their own sweeps.

The Newark Jewelry Novelty Manufacturing Company have moved to larger quarters at 618 Richardson building, have better facilities and are increasing their output. This firm have not been in business long but have made rapid increases and are now firmly established.

The Elizabethtown Smelting and Refining Company have sold their plant at Lyons Farms, near Elizabeth, to the National Dulcin Manufacturing Company. They have built a new plant at Mulberry and Murray streets, this city, and will put in the best of machinery and all that is needed.

The Shiman-Miller Company, who were burned out in their old building, moved to 409 Mulberry street, and got their new plant in full order in five days. This firm are very busy and have had to work overtime. The old building will be ready to be occupied again by January 1.

William Ahrendt, who was patternmaker for Woods & Chatelier, of New York, and Edward Kautzman, who was patternmaker for John Chatelier of this city, have started in business as Ahrendt & Kautzman at 613 Hunterdon street. They will manufacture gold and silver novelties and have put in a complete plant. Mr. Kautzman will do the selling.

A new firm opening up for business this month is the Meyer & Cross Company, 409 Mulberry street, who will make 10 karat gold rings. A line of machinery has been installed and a number of hands put on. They will sell to the retail trade and will later make other lines. J. H. Meyer was with the Queen City Ring Manufacturing Company and Edward J. Gross with the Niagara Ring Manufacturing Company, both of Buffalo, N. Y.

The Newark Purse Frame Manufacturing Company have moved from 43 Lawrence street to 548 South Eleventh street, to their own building. They have enlarged their facilities, and output. They make an initial purse frame silver plate.

Henry Ziruth who was burned out, making chains at the Shirnan-Miller building, has removed permanently to Halsey and Court streets, with first class facilities and is quite busy. This firm is closely connected with the Eastwood-Park Company, making silver goods.

The Orange Manufacturing Company, making medals, have erected a modern three-story brick factory at 178 Emmett street. A first-class plant has been installed with all facilities.

The Arch Crown Manufacturing Company, manufacturing jewelry, have put on the market a stone setting tool, which will be sold to the trade by Henry Zimmern & Company of New York City.

Charles A. Colton, director of the Newark Techincal School on High street, has arranged a full course in jewelry, silver-smithing, plating, etc., and is having a fairly good attendance for the winter term, which started a month ago.

The Leo D. Greenfield Company, Railroad avenue and Hamilton street, who make ladies' and gents' buckles, will move, but have not got a location yet.—H. S.

BUFFALO, NEW YORK.

DECEMBER 5, 1910.

Sheet metal specialties are to be manufactured by the Standard Welding & Machine Company in Buffalo, at 951 Main street. This building, which is a large one, has just been leased for a number of years by this company. Thomas Muffit, well known through his former connection with the National Welding & Machine Company, is president of this firm, and J. L. Heider is the secretary and treasurer.

On Niagara street, near Potomac avenue, the Century Iron & Steel Company is making enlargements to accommodate the increase in business. Their plant is located in the Rose Manufacturing Company's building. W. J. Wark, president of the Century Iron & Steel Company, reports an excellent business for the past season.

A big manufacturing plant will be erected soon in Woodstock, Ont., by the Maxmillian Machine & Tool Company of Buffalo

The recent convention of the New York State Hardware Dealers' Association was largely attended. This organization of hardware wholesalers and jobbers has been doing good work for the trade. R. H. Tremain, of Ithaca, the president, and I. D. Booth, of Elmira, the secretary. The meeting was held at the Statler Hotel.

The Vim Cycle & Hardware Company has just moved into its new quarters on Broadway, where it now occupies three entire floors. The second floor is used for office suite, the display rooms being on the first floor. The company has enlarged its plant and the exterior as well as the interior of the building improved, so that it is one of the finest on Broadway. John Henry is the president of the company.

One of the largest thefts of scrap brass was made recently from the Otis Elevator Company, over 700 pounds being stolen from the factory at Girder and Northland avenues. This brass was taken from a bin containing several thousand pounds of scrap brass which was being loaded into cars for shipment. While the door which led to the bin was forced open and the thieves used a horse and wagon, it has not been possible to get any trace of them.

A full line of automobile accessories is carried by Edward P. Seeber who has just opened on Main street an agency for carrying the Pierce motorcycles and bicycles exclusively. Mr. Seeber was formerly connected with the Pierce factory.

One of the most interesting new departments connected with the Buffalo Art School, which has just opened, is an evening metal industry class. This was opened in response to many requests from students who wished to perfect themselves in metal work. M. H. Blakeslee is the instructor and Bernard V. Carpenter the supervising designer. The class meets every Friday evening, and the registration just at this time of year is very large. The students have turned out some really beautiful pieces of work, many of which will later be placed on exhibition. The articles are rings, bracelets, necklaces, copper ash trays, and desk sets in copper, brass and silver.

E. V. Syrcher, of Genesee street, optician, has added a Globe test cabinet (electric) to his office.

T. C. Tanke Company, manufacturing jewelers, have been doing some original advertising in connection with their Christmas trade publicity. They have been running brief and interesting sketches in the daily papers of the use of gold, silver and platinum in the jewelry manufacturing of the present. The entire history of platinum and the present output of several countries was one of the main features of this first series of the Tanke publicity.

Buffalo's business outlook is exceedingly good in the metal industry trade. The work of the Bureau of Industry of the Chamber of Commerce in bringing new plants to the city has been successful, and four new firms have already located here and will build permanent factories at an early date. Among them the most important is that of the Philadelphia Quartz Company, of Philadelphia, and the plant will cost $100,000. It will manufacture silicate of sodium and the plant itself will occupy five acres. W. H. Stanton is in charge of the Buffalo branch.

Local jewelry and metal industries are all interested in the plans for the promotion of Buffalo-made goods by Buffalo retail houses and consumers which are now being made by the Wholesale Merchants' Association and the Purchasing Agents' Association of the Chamber of Commerce. The propositions for this publicity campaign have not yet been made public, but it is expected that by the first of the year a regular campaign will be mapped out whereby all Buffalo manufacturers will be benefited.

Certification that over one-half of their capital stock is paid in has been made to the county clerk by the Roger-Brown Iron Company which is capitalized at $5,000,000. Hugh Kennedy, William A. Rogers and William Shepard are directors.

Many of the jewelers of Buffalo were hampered somewhat in their Christmas trade by having their stock tied up in the express offices during the recent strike. Trade now, however, is moving briskly.

Business with the plumbing goods manufacturers is exceedingly good. With the great impetus in building which Buffalo has just felt, the demand for brass fittings, faucets and similar goods has been strong.

The aluminum men are also reporting a good trade. The Aluminum Casting Company on Niagara street is running full time and orders are large.

Fries & Company, one of the largest manufacturers of bronze castings in the city, are optimistic about trade, and the outlook for early spring is excellent.

A tour of the department stores, and the counters and window displays of all the jewelers of the city show the thriving business which has been done by the manufacturers of brass and copper goods in attractive novelties, designed for Christmas gifts.

Copper manufacturies who supply the automobile trade feel well satisfied with results.

Buffalo, as the distributing center for the automobile trade, is one of the largest and most important of the count. Surely and steadily the residential section of upper Main street has given way to the rapidly increasing demand of business, and the automobile trade now occupies almost the entire upper section of Main street, between Goodrich and Summer streets. Not only automobile sale houses occupy this locality, but the largest concerns dealing in automobile equipments.

The Ajax Hardware Company, manufacturers, has filed incorporation papers with a capital stock of $10,000. The directors are Adolf Rosenberg, Frank W. Perdel, E. E. Clark and Thomas Hemenway.—McG.

CLEVELAND, OHIO

DECEMBER 5, 1910.

The past month has seen a good volume of business transacted by those industries engaged in metal manufacturing of various kinds. This has been particularly so of the brass factories engaged in the manufacture of household and novelty goods for the Christmas trade. Never before has there been such a lot of this kind of stuff on exhibition. It is selling, too, in a most gratifying manner, though the prices are above those for many other lines of decorative goods. The lasting qualities of brass, copper and bronze, however, appeal to the average buyer, and the extra cost involved does not count for much.

In the faucet and plumbing goods line there has been a steady demand, and the big plants engaged in that trade here have been busy. The brass and copper foundries engaged in a general castings business are busy for the most part, though there may be a little slackness after the new year.

The aluminum business in Cleveland is in a thoroughly healthy condition, according to Edmund E. Allyne, president of the Aluminum Castings Company of this city, who says that while the expiration of patents has not had a noticeable effect in the cheapening of the material itself, the fact that production with several of the big companies is increasing from year to year and the demand for aluminum utensils for household and commercial use is steadily gaining, the volume of business is much larger than four or five years ago, and steadily on the increase. The fact that one of the main patents on aluminum expired early in 1910, and that several minor ones expire in February of 1911, does not seem to have made much difference in the price of aluminum. Mr. Allyne attributes this to the fact that the big producers are at Niagara Falls and on the St. Lawrence River, where water power is cheap, and that it requires a small fortune to attempt competition. Cleveland is now an important center in the working of aluminum, there being a number of foundries in this city which do a large business. Trade during the past year has been exceptionally good, and the outlook for 1911 is very bright.

The annual meeting of the Metal Contractors' Association is to be held in the Chamber of Commerce clubrooms on Friday evening, Dec. 16, at which George P. Early, of Pittsburg, will be the principal speaker. E. A. Roberts, secretary of the Builders' Exchange, will also give an address on "Organization." The association has been taking an unusually active interest in the matter of trade education, and at present has a class of about thirty boys in training in metal work at the Technical High School. Most of these boys are apprentices who work during the day and who study at night. During the past month the metal contractors visited the school to note the progress of their juvenile helpers.

A beautiful specimen of the silversmith's art was received in Cleveland during the past month. It is a magnificent trophy to be awarded by the Cleveland *Plain Dealer* to the victorious football team in a series of contests. The trophy, which was made by Dieges & Clust of New York City, is three feet high and is made of sterling silver and bronze, and represents a gridiron hero in full action.

On Dec. 1 Willis M. Esterly, one of the city's best known sheet metal contractors and manufacturers, died of pneumonia, after but a brief illness. He was treasurer of the Mannen & Esterly Company. For a number of years he was in the employ of J. M. & L. A. Osborn, dealers in sheet metals, going into business for himself in 1904. A wife and three children survive.

Benj. J. Klein, of the Gas Fixture & Brass Company of this city, during the past month closed a deal whereby the firm secures a long lease on its premises at East Fourth street and High avenue, from the owners in London, England. An adjoining tract is also to be secured for further expansion of the concern's business.

The A. J. Clark Manufacturing Company of Youngstown, Ohio, has been incorporated under the laws of Ohio with a capital of $50,000, to engage in the making of gas fixtures, etc. A. W. Hartshorn is the chief incorporator.—S. L. McM.

DETROIT, MICH.

December 5, 1910.

The closing days of November found Detroit enjoying as great business prosperity as at any time during the past few years, a period in which the city has almost doubled its population. Already brass manufacturers are looking over the results of the last eleven months and everyone who has been approached on the subject declares that the year will close with one of the best business records in the history of Detroit. The manufacturers of automobile brass parts were never more rushed with orders than they are at the present time. During the last few months several new plants have been put in operation and large additions made to others. This is rather remarkable as many automobile concerns have added complete brass departments to their plants and are turning out a great quantity of aluminum and brass parts.

Outside the automobile industry, a few manufacturers of other lines of brass, during the preceding weeks have not reported a rush of business although the majority of such institutions have maintained a good record and their output for the month will be fully as good as that of one year ago. It is a pleasure to announce that the outlook for brass exclusive of the automobile trade, is exceedingly encouraging. There seems to be a general improvement throughout Michigan and the adjoining states. Inquiries are coming in regarding new contracts and it is expected that after the holidays business in every department of the brass and aluminum trade will make a jump. It is expected that during the next three or four weeks things will be rather quiet but many manufacturers believe that even the holiday excitement and diversion from business will have little effect on the trade.

Detroit and even the entire lower end of the lower peninsula as well as many surrounding states, shows an increased demand for plumbing goods. This may be accounted for by the large amount of building work that has been in progress and that contractors are rushing their contracts in order to escape the cold weather that is sure to appear. The demand for brass faucets and other brass and aluminum goods is unusually good. This is usually true regarding aluminum castings of every description. The latter metal is being used much more extensively than formerly. This may be accounted for perhaps by the fact that it has been found very serviceable in the manufacture of automobile parts. The manufacturer has found that the metal stands up

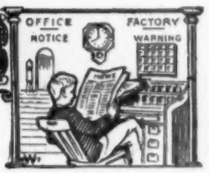
well where it is subjected to all kinds of severe tests such as weather and neglect. As a result of the tests this metal has been put to by the automobile, and at all times has been found successful, the product is now more and more coming into general use, and new plans are being found for it.

As is well known throughout the country, all automobile eyes are constantly being turned toward Detroit, and as in this industry great quantities of brass and aluminum are used, there is no wonder that this city leads in the manufacture of these two products. The automobile industry was never more vigorous here than it is today. It is true that in the last year there have been fewer automobile plants started here, but this is owing to the fact that there is a general trend in the business to seek a more even and established basis.

The opening of the Michigan Central Railroad tunnel under the Detroit river is greatly appreciated by every manufacturer in this city. Heretofore, during the extreme winter weather the river was so full of ice that ferry traffic was held up for days. Freight became congested on both sides of the river and shipments were greatly delayed. The new tunnel now does away with this inconvenience and shippers, including the brass, aluminum and automobile manufacturers will now have a more rapid route to the East through Canada. This improvement will be noticed in New York particularly during the coming winter.

The Hudson Motor Car Company is now at home in its magnificent new plant in the eastern end of Detroit in what is known as the old Fairview district. The ground on which the structures are situated was broken May 7 of the present year. The group consists of the main building, 610 by 60 feet, one wing 410 by 60 and another 210 by 60 feet and the administration building, 180 by 52 feet. The glass area in the walls comprise ninety per cent. of the total wall area, making the structures almost "glass houses." Every attention has been paid to the comfort and convenience of the workmen and the equipment to facilitate the making of automobiles is as near perfection as modern ingenuity could devise. A feature of the works is the experimental room where all the steel, brass, aluminum and other metals will be thoroughly tested before they are declared proper for use.—F. J. H.

TRADE NEWS



TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

Additional Trade News will be found under "Correspondence."

The Indiana Auto Parts Company, Marion, Ind., manufacturers of high grade transmissions, has passed into the hands of a receiver.

The Banner Manufacturing Company, manufacturers of pumps, Ferdinand, Indiana, is building a new foundry and machine shop, which will be 40 by 88 feet.

G. J. Nikolas & Co., 1227-1229 Van Buren street, Chicago, announce that every lighting fixture manufacturer in Chicago is using their celebrated line of lacquers.

The Bradley Polytechnic Institute of Peoria, Ill., is intending to equip a small brass foundry in the near future and would be glad to receive catalogs of crucibles, furnaces, supplies, etc.

The Electric Smelting and Aluminum Company, Lockport, N. Y., smelters and manufacturers of aluminum, silicon and manganese alloys, have started the erection of a large chemical plant.

Five acres of land on the Watertown road have been purchased by the Waterbury Tool Company, Waterbury, Conn. The company have not yet decided for what purpose they will use the land.

The report that the Deane Steam Pump Company, Holyoke, Mass., was going to erect a $20,000 brass foundry is denied by that company. They say that they have no intention of building a brass foundry.

The American Platinum Works, platinum, gold and silver refiners, have moved into their new quarters at 225-231 N. J. R. R avenue, Newark, N. J. The company have spent nearly a year in remodeling this building.

The Creutz Plating Company, Cincinnati, Ohio, are increasing the capacity of their plant and installing new machinery to accommodate increased business. This up-to-date plant occupies the entire fifth floor of the Lion building.

Joseph Landsman, electroplater and colorer, 51 Maiden Lane, New York, who makes a specialty of silver deposit ware, repairing and replating, has recently doubled the capacity of his plating plant in order to accommodate increased business.

R. B. Seidel, Inc., manufacturer of crucibles, Philadelphia, Pa., is making general improvement to his plant. One of the new features will be a large kiln for burning black lead crucibles, which will increase the burning capacity fully 80 per cent.

The corporate name of the Bennett-O'Connell-Stevens Company has been changed to Bennett-O'Connell Company. This well known concern manufactures platers' and polishers' equipment and supplies at 15-17 South Clinton street, Chicago, Ill.

George Eberhard, 9 Calandar street, Providence, R. I., who makes a specialty of spinning high-grade silver ware, reports business as being very good. For the past four months he has had to run his factory overtime until nine o'clock every evening.

The firm formerly known as the Albany and North River Molding Sand Company, Albany, N. Y., has changed its name to the Albany Sand & Supply Company. This has been done merely for the sake of convenience. There has been no change in owners or officers.

The Wright Company is manufacturing an aeroplane with nickel plated trimmings which they expect to exhibit at the coming Aeroplane Show, which it is reported will be held in conjunction with the Automobile Show at Madison Square Garden, January 7 to 21, 1911.

Henry Disston & Sons' saw works, Tacony, Philadelphia, Pa., are experimenting with a crucible plant of their own for the manufacture of clay crucibles used in melting steel. No decision has been reached as to whether they will ultimately continue the operation of the plant or not.

J. W. Paxson Company, Philadelphia, Pa., manufacturers of foundry equipment, announce that they will carry a large stock of foundry equipment and supplies at their branch in Detroit, Mich., at Sixth and Congress streets. W. S. Thomas represents the company in that territory.

The Schade Valve Manufacturing Company, 56 South Second street, Philadelphia, Pa., manufacturers of steam and water specialties, engineers' and mill supplies, are now located in their new quarters on American street, above Cumberland, and have placed upon the market the first product of their manufacturing department—the Schade balanced float valve.

The New Haven Sherardizing Company, State and Lawrence streets, New Haven, Conn., announce that they are doing a large

and increasing business in sherardizing nails, screws, bolts, etc. The process of sherardizing has been fully described in THE METAL INDUSTRY from time to time, and this company has excellent facilities for turning out the work promptly and at moderate cost.

The Rockwell Furnace Company, 26 Cortlandt street, New York, announce that they have acquired the exclusive right to manufacture and sell the well-known Moyer tramrail. A. W. Moyer will hereafter be associated with this concern in the capacity of manager of its foundry equipment department, in which will be included melting furnaces, core ovens and overhead foundry tramrail systems.

Martin Brothers, platers and polishers, 59 Ann street, New York, are using a tumbling barrel secured from the U. S. Electro Galvanizing Company, 1-9 Park avenue, Brooklyn, N. Y., with excellent results. This firm turns out a large quantity of small brass goods, such as bolts, nuts and screws, and is now working on a contract for The Edison Phonograph Company for 200,000 phonograph cabinet handles.

Kirk & Blum, sheet metal workers, of Cincinnati, Ohio, have just finished up the sixteenth of a series of exhaust systems for the National Cash Register Company, Dayton, Ohio. This firm also contracted for systems for the Dayton Plating & Manufacturing Company, Dayton, Ohio; the Jeffries Manufacturing Company, Columbus, Ohio, and the American Seeding Machinery Company of Richmond, Indiana.

The Turner Machine Company, 3632 North Lawrence street, Philadelphia, Pa., announce shipments of their machinery during October as follows: Two sand sifters to Italy; one sand sifter to London; one molding machine to Mexico; several automatic cock grinders to St. Petersburg; a number of sprue cutters, molding machines, sand sifters, etc., to Australia, Canada and foreign countries not mentioned above. This company recently issued a new catalog that completely describes its line of foundry and machine shop specialties.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., Dec. 20, 1910, and publicly opened immediately thereafter, to furnish at the navy yard, Norfolk, Va., a quantity of naval supplies, as follows: Sch. 3,159—Solder. Sch. 3,162—Lead pipe. Sch. 3,166.—Manganese bronze, sheet brass, etc. Applications for proposals should designate the schedules desired by number. Blank proposals will be furnished upon application to the navy pay office, Norfolk, Va., or to the bureau. T. J. Cowie, Paymaster-General, U. S. N.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., Dec. 20, 1910, and publicly opened immediately thereafter, to furnish at the Navy Yard, Norfolk, Va., brass, naval, rolled 7,700 pounds, schedule 3166; brass, sheet, 5,100 pounds, schedule 3166; bronze, manganese, 30,000 pounds, schedule 3166; also at the Navy Yard, Washington, D. C., brass, sheet, 27,000 pounds, schedule 3155. Blank proposals will be furnished upon application to the navy pay office, nearest each navy yard, or to the Bureau, T. J. Cowie, Paymaster-General, United States Navy.

A business man in northern Europe advises an American consular officer that he at present represents Belgian and German dealers in copper, brass and aluminum, but desires to get into direct communication with American exporters and producers of these metals. The report states this is an exceptionally good opportunity for exporters of copper especially, as the importation of this metal from the United States could be greatly increased by having a responsible agent on the spot. He will furnish all the references and guaranties which may be required. Names and addresses on file at the Bureau of Manufactures, Washington, D. C.

The National Bronze & Aluminum Foundry Company, manufacturers of brass, bronze and aluminum castings, of Cleveland, Ohio, report through J. H. Shafner, vice-president and general manager, that they are very busy and have had a very prosperous year. This concern has made in the past eight months three additions to their plant, the main one being an additional foundry, 50 x 130, which was erected across two lots, recently purchased, adjoining the present location. They have also installed five additional melting furnaces, two car core-ovens, aluminum furnaces, cranes, etc., and now have a strictly up-to-date and well equipped foundry.

Announcement has been made that the business of William Forgie, Washington, Pa., had passed into the hands of the Duff Manufacturing Company, Pittsburgh, Pa. The latter concern has bought the entire Forgie plant, including its business and all rights and privileges of making the oil well jacks originated in the early days of business by William Forgie. The Forgie line will be added to the present list of Duff products. The local company already manufactures an oil well jack, but will now put out this additional type, which was designed especially for work in the oil fields. Most of the machinery in the Washington plant has been transported to the Duff factory on the North Side.

ALUMINUM BALLS, SOLID AND HOLLOW.

The Aluminum Goods Manufacturing Company, with general offices at Newark, N. J., and factories in Newark, N. J., Two Rivers, Wis., and Manitowoc, Wis., announce that they have the machinery and tools with which to manufacture economically aluminum balls, both solid and hollow. The company says it is not an easy matter to manufacture these balls, and they do not carry them in stock, but they are ready at any time to make up a lot according to order. They do not manufacture balls as samples.

The Aluminum Goods Manufacturing Company are also ready at any time to execute orders for all kinds of aluminum goods, and with their several factories located in different parts of the country, can give customers prompt and satisfactory attention.

FIRES

On Nov. 5 a fire completely destroyed the finishing department of the Acme Brass Works on Woodland avenue, Cleveland, Ohio, causing a loss of $75,000. Plans are now being made for a new building to cost $150,000.

A disastrous fire, in which a number of lives were lost, destroyed a large manufacturing building at 216 High street, Newark, N. J., recently, one the burned-out firms being that of John Blevney, manufacturer of the "Blevney" belt polishing machines.

REMOVALS

The Philadelphia Art Metal Works, formerly of 328 Noble street, Philadelphia, Pa., manufacturers of brass bank and office fixtures and brass fireplace goods of a high quality, for ten years, have removed to their new building, 323 Vine street, where their improved facilities and a fine display room will enable them to supply the wants of their customers better than ever.

The works of the O. J. Moussette Company are being removed to the foot of Fifty-seventh street, Brooklyn, N. Y., where the company has very greatly increased facilities for manufacturing the "Monarch" crusher, pulverizer and cinder mill, and for doing general machinery and construction work. They intend to make a specialty of marine work, including ship, launch and boat building, and will be prepared to handle any kind of mechanical contracting. O. J. Moussette, secretary of the company, is well known as the inventor and manufacturer of the "Monarch" crusher, which is widely used by brass mills, foundries and smelters.

INCREASE OF CAPITAL STOCK

Among the Detroit concerns that have increased their capital during the past month are the Yates-Upholt Brass Company from $20,000 to $40,000, and the Herreshoff Motor Car Company to $250,000.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

FACTORIA BRASS GOODS COMPANY, Seattle, Wash. Capital, $100,000. Incorporators: George A. Banghan and Clay Allen, of Seattle.

THE WINKLEY COMPANY OF CANADA, Windsor, Canada. Capital, $100,000. To manufacture brass goods. Branch of a United States concern.

MURRAY BRASS MANUFACTURING COMPANY, Detroit, Mich. Capital, $40,000. To manufacture brass, copper and sheet metal. Manager, W. D. Murray, of Detroit.

WOLVERINE MOTOR SUPPLIES COMPANY, Detroit, Mich. Capital stock, $2,500. Stockholders: F. A. Van Fleet, Philip Breitmeyer, Frank W. Kanter and John Gillespie, all of Detroit.

SERVISCAR MOTOR COMPANY, Detroit, Mich. Capital, $10,000. Stockholders: George C. Chene, George V. Potter, Louis J. Hirschman, Frederick J. Nicholson and Louis V. Raulet, all of Detroit.

THE BLESCH METAL MANUFACTURING COMPANY, Detroit, Mich. Capital, $15,000. To smelt and refine metals. Incorporators: Otto Blesch, Edward E. Pratt and Hugh M. Edwards, all of Detroit.

HERBERT G. WHITEHOUSE, INC., Newark, N. J. Capital stock, $50,000. To manufacture brass and wood novelties. Incorporators: H. G. Whitehouse, E. A. Whitehouse and E. C. Vehsiage, all of Newark.

ALUMINUM SPECIALTIES MANUFACTURING COMPANY, Fulton, N. Y. Capital, $7,500. To manufacture aluminum specialties. Incorporators: T. S. Jackson, G. H. Spitzle, Utica, N. Y., and John R. Sullivan, Fulton, N. Y.

METROPOLITAN ENGINEERING COMPANY, Jersey City, N. J. Capital stock, $125,000. Mechanical engineers, brass founders and metal workers. Incorporators: T. H. Beardsley, G. Tiernan, R. G. Redlefsen, all of Jersey City.

STANDARD BRASS AND METAL WORKS of Knox County, Nashville, Tenn. Capital stock, $5,000. Incorporators, Jesse L. Malcolm, B. S. Newman, W. J. Savage, Charles Funk and Wendell Ruof, all of Nashville.

CONSOLIDATED CASTING COMPANY, Mechanicsville, N. Y. Capital stock, $20,000. To manufacture castings of all kinds. Incorporators: Arthur H. Trumbull, Syracuse, N. Y., and R. V. Thompson, Mechanicsville, N. Y.

RENSSELAER VALVE COMPANY, Troy, N. Y. Capital stock, $500,000. To manufacture valves, hydrants, brass castings and foundry products. Incorporators: E. L. Rowe, I. A. Rowe, Troy; and T. Breslin, Waterford, N. Y.

BRASS CITY MANUFACTURING COMPANY, Waterbury, Conn. Capital, $10,000. To manufacture metal buckles and other metal articles. Incorporators, John F. McGrath, Simon Taitel, Abram Fish and William Lebowitz, all of Waterbury.

THE RIPLEY FOUNDRY & MACHINE COMPANY, Ripley, Ohio. Capital stock, $30,000. Manufacturers of brass, iron and semi-steel castings. Incorporators: R. L. Russell, H. L. Russell, Walter L. Russell, Frank M. Russell and Penn Flaugher, all of Ripley.

STEUBNER-POWELL-ANTI-FRICTION BEARING COMPANY, Philadelphia, Pa. Capital not stated in preliminary application. To manufacture and sell bearings of all kinds and metal products. Incorporators: Henry Steubner, George N. Powell, Ida K. Powell, John H. Beaver, Frank Steubner and James D. Boynton, all of Philadelphia.

PRINTED MATTER

THE NEWPORT SAND BANK COMPANY, Newport, Ky., are issuing some advertising matter in the form of blotters, which present colored views of landscapes and which are gotten up in very attractive form.

BRASS AND COPPER GOODS.—A comprehensive 275-page illustrated catalogue has been issued by the American Brass and Copper Company, 132-138 Lafayette street, New York, covering the company's line of brass and copper goods, including gas brackets and arms, gas pendants and bottoms, electric arms and other fixtures, as well as plumbers' supplies.

GEAR CUTTING SPEEDS.—A small eight-page booklet issued by the Adams Company, molding machine manufacturers of Dubuque, Ia., gives a condensed lot of data relating to the hobbing method of producing gears. Speeds and feeds used on the Farwell hobber are included, and constitute valuable information for anyone interested in the manufacture of gears.

CASTINGS is the subject of a six-page folder issued by the newly organized firm of the Rider-Bagg Company, successors to J. B. Chapman & Co., brass founders, coppersmiths and machinists, Springfield, Mass. This company makes a specialty of light and heavy brass castings of any kind; also aluminum, bronze and special metals for special uses, and they report that they have such facilities that they can fill any order on short notice.

SHERARDIZING.—The Sherardizing Magazine, an anti-rust periodical, issued by the United States Sherardizing Company, New Castle, Pa., has been issued in the form of a double number for October and November. This pamphlet gives a complete report of tests made upon sherardizing by Prof. Charles F. Burgess of the University of Wisconsin, Madison, Wis. The report makes very interesting reading, and copies may be obtained by application to the United States Sherardizing Company.

AD NEWS

George Bender, 82 Centre street, New York, announces that he has five hundred bargains in dynamos and motors suitable for lighting, plating and power purposes for sale or to rent.

The Manhattan Brass Company, 332 East 28th street, New York, are advertising their brass and bronze in sheet, rod, wire, tube, moulding, etc. This well-known and old-established rolling mill also takes orders for manufacturing metal goods of almost any kind from brass, bronze and copper.

The Aluminum Solder Company, 199 Berkeley street, Boston, Mass., state in their advertisement that the Massachusetts Institute of Technology has tested their aluminum solder and report a strength of 11,090 pounds per square inch at soldered joints. The manufacturers of this solder offer $100 reward for any broken piece of aluminum they fail to repair satisfactorily with their solder. They offer to send sample sticks at $1.00 each.

INFORMATION BUREAU

Any firm intending to buy metals, machinery or supplies, and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Commercial questions are answered by return mail. Our Information Bureau is for the purpose of answering questions of all kinds. Address THE METAL INDUSTRY, 99 John street, New York.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the back advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds. See Want Ad. pages.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)

December 8, 1910.

		Pounds.
Stocks of marketable copper of all kinds on hand at all points in the United States, Nov. 1, 1910.....		139,261,914
Production of marketable copper in the United States from all domestic and foreign sources during November, 1910.....		119,353,463
		258,615,377
Deliveries:		
For domestic consumption.....	60,801,992	
For export	67,424,316	128,226,308
Stocks of marketable copper of all kinds on hand at all points in the United States, Dec. 1, 1910....		130,389,069
Stocks decreased during the month of November...		8,872,845

METAL MARKET REVIEW

NEW YORK, December 12, 1910.

COPPER.—The market for standard copper in London has been very dull, and the fluctuations during the month have been very slight. Opening at £57 2*s.* 6*d.*, prices touched £56 18*s.* 9*d.*, the lowest, advanced to £58 5*s.*, the highest, and closed at £57 5*s.*, having values 2*s.* 6*d.* above the opening.

In the New York market prices have ruled fairly steady at around 13 cents for Lake and from 12¾ up to 13 cents for Electrolytic—closing at 13¾, while casting brands have sold at from 12.70 to 12.90 and closed at 12.75.

The market has been very dull and the demand from consumers and for export has not been as active as the last few months. Most consumers were pretty well covered for the balance of the year and as producers have all asked an advance of ⅛ or more for next year's delivery consumers have generally held off. There was a feeling of disappointment in the trade when the October figures of the Copper Producers' Association were published and instead of a reduction in the stocks of about 20,000,000 pounds as expected, there was a decrease of only 9,531,800 pounds in November 1; this was looked upon as unsatisfactory and consumers from being ready buyers withdrew from the market, and prices at the close are a shade below the highest, and the market as a whole is more in buyers' favor than a month ago.

In referring to the stocks on hand in our review of November 14 last we said, "Having a stock on hand today of 139,261,914 pounds, against a total of 340,000,000 pounds in March, 1910, the high point of the year," we should have compared the stock of today with the stock on hand August 1, a total of 170,640,678 pounds. According to the European copper statistics, being the stocks and visible supply of copper in England and France, the visible supply on December 1 was 86.250 tons, against a visible supply of 114,100 tons on February 15, 1910, the highest point of the year. These European statistics only give the English and French stocks and ignore the heavy stocks being carried in Germany and for this reason these European statistics are really unreliable.

The market is dull and rather easier, with prices at the close possibly ⅛ cent below the highest of the month. The exports for the month were 29,079 tons against 24,028 tons the same period a year ago. The total exports for the eleven months show a decrease of 4,588 tons compared with the same period last year.

TIN.—The London tin market continues in the grip of the "bull" syndicate and the market is rigged to catch any belated "bears" that may still be bucking the market and incidentally to squeeze the American consumer. Spot tin opened at £167 7*s.* 6*d.*, touched £162 10*s.* the lowest, advanced to £170 12*s.* 6*d.* and closed at £169 15*s.* and the end is not yet, as it is common report that prices may go much higher.

In the New York market consumers have to pay whatever price is made in London. The deliveries during November were 3,800 tons and at present prices no one is buying tin except for immediate consumption and the whole country is absolutely bare of stocks, so that we have to go on buying every month from 3,000 tons say to 4,000 tons and this tin all has to come from the London syndicate. The arrivals during November were 3,331 tons and consumption was 3,800 tons; the total shipments from the Straits were only 4,843 tons and on this basis stocks are likely to decrease and prices will, more than likely, increase. Tin today, 5 to 10 cents is around 38½ cents. Later: London market very strong, £176 15*s.* today. New York market excited. Cost to import 38¾. It is predicted tin will reach 40 cents.

LEAD.—The London market stays around £13 to £13 5*s.*

In the New York market the trust advanced their price to 4.50 New York for 50 tin lots, and the general market after selling around 4.45 is up to 4.50 New York for carload lots. In St. Louis the market is steady at 4.35 to 4.40.

SPELTER.—London price holds £24.

In the New York market prices hold very steady and show a net advance for the month of ⅛ cent from 5⅞ to 6c. New York and at close 6c. to 6.05. In St. Louis the market is held steady at around 5.85.

ALUMINUM.—The market is firmer and prices have advanced from 22¾ to close to 23 cents for wholesale lots, small lots from 23½ to 23¾.

ANTIMONY.—The price of Cookson's antimony has been dropped from 8⅛ cents to 7¾ Hallett's unchanged at 7¾, Chinese 7¼, Hungarian grade at around 7 cents.

SILVER.—In London silver opened at 25 13/16 advanced to 26*d.* and closed at 25⅜*d.* In the New York market prices closely followed the London figures, opening at 56 cents; prices advanced to 56⅜ and closed at 55—a net decline for the month of 1 cent an ounce.

QUICKSILVER.—The market has been easier and prices have been dropped from $46.00 per flask to $42.00 today for wholesale lots, with small jobbing lots at $42.50 to $43.00 per flask.

PLATINUM.—The market has been quite active, but at the close is very dull and more or less weak at $41.00 for hard and $39.00 for ordinary in a wholesale way—scrap is worth from $33.00 to $34.00.

SHEETS.—No change in sheet copper or copper wire at 18 cents and 14¼ cent base. High sheet brass at 14.50 base. There seems to be no longer any agreement in sheet copper and we hear of cuts of from 1 to 2 cents below the list prices.

OLD METALS.—The market has been rather more active, consumers have taken more interest and the outlook generally is brighter than for some months.

J. J. A.

NOVEMBER MOVEMENTS IN METALS

COPPER.	Highest.	Lowest.	Average
Lake	13.50	13.00	13.00
Electrolytic	13.00	12.75	12.85
Casting	12.90	12.70	12.80
TIN	37.50	35.80	36.65
LEAD	4.50	4.45	4.45
SPELTER	6.05	5.85	5.95
ANTIMONY (Hallett's)	7.75	7.70	7.75
SILVER	.56⅜	.54⅞	55.63

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.

1909.—Average for year, 13,416. 1910, Jan. 13⅞. Feb. 13⅞. March, 13¾. April, 13¼. May 13. June 12¾. July 12¾. Aug. 12¾. Sept. 12¾. Oct. 12⅞. Nov. 13.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the reports alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

Metal Prices, December 12, 1910

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	13.00
Electrolytic, carload lots	12.75
Casting, carload lots	12.70
TIN—Duty Free.	
Straits of Malacca, carload lots	38.75
LEAD—Duty Pigs, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.50
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western carload lots	6.05
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	23.00
ANTIMONY—Duty 1½c. per lb.	
Cookson's, cask lots, nominal	7.75
Hallett's, cask lots	7.75
Other cask lots	7.12
NICKEL—Duty Ingot, 6c. per lb. Sheet, strips and wire 35% ad valorem.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE METAL—Duty 20%	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25% ad valorem	$1.60
BISMUTH—Duty free	2.10
CADMIUM—Duty free	.80
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.54⅜
PLATINUM—Duty free	$39.00 to $41.00
QUICKSILVER—Duty 7 c. per lb. Price per pound	.60c. to 62c.

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
11.25 to 11.50	Heavy Cut Copper	12.25 to 12.50
10.75 to 11.00	Copper Wire	11.75 to 12.00
9.75 to 10.00	Light Copper	10.75 to 11.00
10.25 to 10.50	Heavy Mach. Comp.	11.25 to 11.50
7.50 to 7.75	Heavy Brass	8.25 to 8.50
5.75 to 6.00	Light Brass	6.75 to 7.00
7.25 to 7.50	No. 1 Yellow Brass Turnings	8.00 to 8.25
8.25 to 9.00	No. 1 Comp. Turnings	9.25 to 9.50
3.90 to 4.00	Heavy Lead	—— to 4.25
3.75 to 3.90	Zinc Scrap	—— to 4.25
5.00 to 5.50	Scrap Aluminum, turnings	5.00 to 6.50
10.00 to 12.00	Scrap Aluminum, cast, alloyed	11.00 to 13.00
14.00 to 15.00	Scrap Aluminum, sheet (new)	16.00 to 18.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
25.00 to 27.00	Old Nickel	28.00 to 30.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% to 20%.....according to quantity	28 to 35
Silicon Copper, 30% guaranteed... " "	38
Phosphor Copper, 5% ..... " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed ..... " "	28 to 30
Manganese Copper, 30% ..... " "	30 to 35
Phosphor Tin ..... " "	34 to 36
Brass Ingot, Yellow ..... " "	9 to 10
Brass Ingot, Red ..... " "	11 to 12½
Bronze Ingot ..... " "	10 to 11
Manganese Bronze ..... " "	17 to 19
Phosphor Bronze ..... " "	13 to 16
Casting Aluminum Alloys..... " "	29 to 35

PHOSPHORUS—Duty 18c. per lb.
According to quantity ..... 30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 18 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7⅞ to 9⅝ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7⅞ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from. 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ¾ inch diameter or over ..... Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

ZINC—Duty, sheet, 1¾c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill	7.75 less 8%
Casks	8.25
Open casks	8.75

Metal Prices, December 12, 1910

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect Dec. 5, 1910, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.13¾	$0.15¼	$0.17
Wire	.13¾	.15¼	.17
Rod	.13¾	.15⅞	.18
Brazed tubing	.18⅝	—	.20¾
Open seam tubing	.16⅝	—	.18¾
Angles and channels, plain	.16⅞	—	.18¾

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet	—Extra spring drawing and spinning brass...	½c.	per lb.	net	advance
"	—Best spring, drawing and spinning brass....	1½c.	"	"	"
Wire	—Extra spring and brazing wire.....	½c.	"	"	"
"	—Best spring and brazing wire.....	1c.	"	"	"

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.14¾	$0.16¼	$0.18
Wire	.14¾	.16⅞	.18
Rod	.14¾	.16⅞	.19
Brazed tubing	.19⅝	—	.21¾
Open seam tubing	.17⅝	—	.19¾
Angles and channels, plain	.17⅞	—	.19¾

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet	—Extra spring drawing and spinning brass...	½c.	per lb.	net	advance
"	—Best spring, drawing and spinning brass....	1½c.	"	"	"
Wire	—Extra spring and brazing wire.....	½c.	"	"	"
"	—Best spring and brazing wire.....	1c.	"	"	"

BARE COPPER WIRE—CARLOAD LOTS.

14¼c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c. per lb. base.
100 lbs. to 300 lbs. in one order	19c. " " "
Less than 100 lbs. in one order	20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 8½ in O. D. Nos. 4 to 13 Stubs' Gauge, 18c. per lb.
Seamless Copper Tubing, 21c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	26	25	20	19	18	18	18	18	18	18	18	19	20	22	24	25

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

		Per 100 feet— Brass.	Bronze.
⅜	inch	$8	$9
½	inch	8	9
⅝	inch	10	11
¾	inch	12	13
⅞	inch	14	15
1	inch	18	20
1¼	inch	22	24
1½	inch	25	27
1⅔	inch	32	35
1¾	inch	45	48
2	inch	56	60

Discount 55 and 5%.

PRICES FOR MUNTZ'S METAL AND TOBIN BRONZE.

Muntz's or Yellow Metal Sheathing (14" x 48")	14½c.	net base
" " " Rectangular sheets other than Sheathing	16½c.	" "
" " " Rod	14½c.	" "
Tobin Bronze Rod	16c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 22¾c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than.....	3in.	6in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.
	and including.....	12in.	14in.	16in.	18in.	20in.	24in.	30in.	36in.	40in.
		in coils.								
No.	13 and heavier	34	34	36	36	36	36	39	39	39
"	14	34	34	36	36	36	36	39	39	39
"	15	34	34	36	36	36	36	39	39	39
"	16	34	34	36	36	36	36	39	39	39
"	17	34	34	36	36	36	36	39	39	39
"	18	34	34	36	36	36	36	39	39	42
"	19	34	34	36	36	36	36	39	40	43
"	20	34	36	36	36	36	38	41	42	44
"	21	34	38	38	38	38	40	43	44	50
"	22	34	38	38	38	40	40	43	47	51
"	23	34	38	38	38	40	40	43	49	53
"	24	34	38	40	42	42	42	45	51	54
"	25	36	39	41	43	43	43	46	53	57
"	26	36	39	42	46	46	46	51	55	61
"	27	36	40	44	48	48	49	54	58	64
"	28	36	40	46	48	49	49	56	62	67
"	29	38	41	48	50	52	52	61	67	73
"	30	38	42	50	52	56	62	69	72	77
"	31	43	47	55	58	63	71	74	77	83
"	32	45	49	57	61	69	77	91	90	95
"	33	47	51	60	65	73	84	91	100	110
"	34	50	55	62	70	78	91	108	110	120
"	35	..	65	70	80	90	100	115	125	..
"	36	..	80	90	100	115	120	135	..	..
"	37	..	104	114	129	144	159	174	..	..
"	38	..	124	139	154	169	184	204	..	..
"	39	..	144	164	184	204	224	..	..	..
"	40	..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 35 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	37	
18.	.049.	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	91
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.53
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent. to No.	19,	B. & S.	Gauge,	inclusive..... $0.60
6	" "	19,	"	"	" ..... .70
9	" "	19,	"	"	" ..... .85
12	" "	19,	"	"	" 1.00
15	" "	19,	"	"	" 1.15
16	" "	19,	"	"	" 1.30
18	" "	19,	"	"	" 1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. to 3½c. above the price of bullion.

ALUMINUM COMPANY OF AMERICA

PITTSBURGH, PA.

ALUMINUM

SHEET TUBING
EXTRUDED SHAPES
ROD RIVETS WIRE
ELECTRICAL CONDUCTORS

Branch Offices

NEW YORK—99 John St.
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CHICAGO—Old Colony Bldg.
PITTSBURGH—2344 Oliver Bldg.
PHILADELPHIA—320 Witherspoon Bldg.
ROCHESTER—406 Powers Block
CLEVELAND—719 Garfield Bldg.
WASHINGTON—514 Nat. Met. Bk. Bldg.
DETROIT—1515 Ford Bldg.

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METAL ROLLING MILLS.

INGOT, PLATE, SHEET, ROD, WIRE, TUBE, METAL GOODS.

HENDRICKS BROTHERS
Manufacturers of
Sheet and Bar Copper
COPPER FIREBOX PLATES
and STAYBOLTS
WIRE and BRAZIER'S RIVETS
IMPORTERS AND DEALERS IN
INGOT COPPER, BLOCK TIN,
SPELTER, LEAD, ANTIMONY
BISMUTH, NICKEL, Etc.
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Established 1802 Cable Address: "Scovill"
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WATERBURY, CONN.
THE LARGEST AND MOST FULLY EQUIPPED BRASS ROLLING MILLS AND METAL GOODS MANUFACTURING ESTABLISHMENT IN THE WORLD
Estimates for Specialties in Brass, German Silver and Aluminum furnished on application. DEPOTS:
NEW YORK: 75 Spring St. BOSTON: 170 Summer St. CHICAGO: 210 Lake St.

WATERBURY BRASS CO.
General Offices, Mills and Factories.
Waterbury, Conn.
NEW YORK OFFICE, 99 JOHN STREET.
Providence (R. I.) Store, 131 Dorrance St.
Shipments Upon Receipt of Order From Large Stock of
SEAMLESS DRAWN BRASS AND COPPER TUBING
BRASS {SHEET ROD WIRE} COPPER {SHEET ROD WIRE}
AT WATERBURY GERMAN SILVER {SHEET ROD WIRE}

Non-Corrosive Finest Quality
COPPER AND YELLOW
(Muntz) Metal
Naval Brass
Naval Bronze
Manganese Bronze
Plates, Sheets, Bolts, Bars, Rods, Nails, Tacks, &c.
Taunton-New Bedford Copper Co.
NEW BEDFORD, MASS.
71 Water St., New York 61 Batterymarch St., Boston

C. G. HUSSEY & CO.
PITTSBURGH, PENNA.
Manufacturers of
COPPER
In Sheets, Plates, Rolls
ANODES
Tacks and Nails

"BRIDGEPORT" BRONZE ROD
Manganese Bronze
Aluminum Bronze
Phosphor Bronze
Silicon Bronze
SEAMLESS BRASS and COPPER TUBING
Brazed Brass Tubing
Sheet Brass - Sheet Copper
German Silver—Brass and Copper Rods
BRIDGEPORT BRASS CO., Manufacturers
BRIDGEPORT, CONN.

BRASS and COPPER in Sheets and Rolls
SILVER PLATED METAL (for Coach Lamps)
BRITANNIA METAL
B. & M. BABBITT METAL for Bearings
LINING METAL for Automobile Bearings and Copper for Electrical Purposes
H. K. & F. S. BENSON
GLEN RIDGE, N. J.

THE SEYMOUR MFG. CO.
SEYMOUR, CONN.
German Silver
BRASS, COPPER and BRONZE IN SHEETS, WIRE, RODS and TUBES
COPPER AND NICKEL ANODES
Resistance Wires, Wire, Shot Copper

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WATERBURY, CONN.
MANUFACTURERS OF
SEAMLESS..... NICKEL SILVER, BRASS, COPPER, BRONZE AND PURE COPPER **TUBING**
TUBING FOR ELECTRICAL PURPOSES
Odd and Special Shapes, and Small Tubing, a Specialty
—ALSO THE—
Bourdon Steam Gauge Springs
All sizes from 8 to 36, B. & S. Gauge.

The Ansonia Brass and Copper Co.
99 JOHN ST., NEW YORK
MANUFACTURERS OF
BRASS and COPPER Sheets, Tubes, Rods and Wire
SOLE MANUFACTURERS TOBIN BRONZE
(Trade-Mark Registered)

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Manhattan Brass Company
332 East 28th St. :: New York City
Manufacturers of
BRASS and BRONZE in Sheet, Rod Wire, Tube, Moulding, etc. METAL GOODS made to order from Brass, Bronze and Copper.

"RIVERSIDE" German Silver Phosphor Bronze
Sheets, Rods, Wire, Ingots, Castings, Jewelers' Bars and Alloys
The Riverside Metal Co.
Riverside, Burlington Co., N. J.

SPECIAL SHAPES
Wire Drawing, Tinning, Slitting
in
BRASS, BRONZE, COPPER, STEEL, ALUMINUM, GERMAN SILVER AND SPECIAL ALLOYS.
THE ELECTRICAL ALLOY CO., Morristown, N. J.

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METAL ROLLING MILLS.

INGOT, PLATE, SHEET, ROD, WIRE, TUBE, METAL GOODS.

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Wm. F. Renziehausen Co.

Rollers of Silver Anodes and Sterling Silver

ALSO DEALERS IN
FINE GOLD AND SILVER

43-47 Oliver St., Newark, N.J.
Long Distance Phone 3759 R.

LINTON & CO.

95 PINE STREET PROVIDENCE, R. I.
MANUFACTURERS OF
GOLD SOLDER
Sheet or Wire
SILVER SOLDER
Sheet or Wire
SHEET BRASS SOLDER

PHENIX TUBE CO.
Manufacturers of
Brass and Bronze Iron Lined Tubes
Brazed Steel Tubes,
Round and Square.
Main Office and Mills: Brooklyn, N. Y. City Branch Offices: Chicago, San Francisco

THE PILLING BRASS CO.
WATERBURY, - - CONN.
Manufacturers of
Rolled Brass, Bronze, German Silver and Copper in Thin Gauges, Platers' Metal

Established 1859. Telephone connection.
JOHN TOOTHILL
BRITANNIA METAL. ANTIMONIAL LEAD.
SHEET BLOCK TIN
CASTING, ROLLING AND REFINING.
85 Barclay St., New York City
ROCHELLE PARK, N. J.

SEAMLESS STEEL TUBING
From 4 in. Diameter to 1-64 in.
Finished Bright, Smooth and Accurate to 1-1000 In. Inside and Out
Tool Steel Tubing. Soft Steel Tubing. Also Small Brass, Copper and Aluminum Tubing.
ELLWOOD IVINS TUBE WORKS
Oak Lane Station, Philadelphia, Pa.

ROLLED FIRELESS STERLING SILVER
SILVER SOLDERS, ANODE SILVER and SILVER WIRE
For further information address
JOHN J. JACKSON CO.
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Britannia Metal *CASTING, ROLLING and REFINING FOR THE TRADE.*
STANDARD ROLLING MILLS
363 HUDSON AVENUE, BROOKLYN, N. Y.

MANUFACTURERS OF PLATED SHEET METALS
SHEET METAL AND WIRE GOODS

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NATIONAL SHEET METAL CO.
Manufacturers of
PLATED SHEET METALS
FANCY ROLLED METALS
Nickelzinc, Brasszinc, Copperzinc, Bronzezinc, Nickeltin, Brasstin, Coppertin, Bronzetin Sheet Zinc, polished and unpolished, for stamping.
Large Saving to Manufacturers *Last Year's Sales 1,000,000 lbs.*
For Further Information Address Office: PERU, ILLINOIS

THIS SPACE FOR SALE
SEND FOR RATES

BUCKLE TONGUES
made from any metal desired.
English style. The finest made.
THE CAMPBELL-WARNER CO., Middletown, Conn.

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LEAD AND ZINC SMELTERS AND MANUFACTURERS

PIG LEAD, SPELTER, SHEET ZINC AND ROD, ACIDS

Matthiessen & Hegeler Zinc Co.
LA SALLE, ILLINOIS
Smelters of Spelter
and Manufacturers of
Sheet Zinc and Sulphuric Acid
Zincs for Leclanche Battery
Special Sizes of Zinc to order. Rolled Battery Plates. Selected Plates for Etchers' and Lithographers' use. Selected Sheets for Paper and Card Makers' use. Stove and Washboard Blanks.

Horsehead Spelter
The Original Brand of Pure Spelter
Indispensable in the manufacture of
Cartridge Metal, German Silver, Fine Spun Work, Fine Castings, Superior Alloys, &c.
THE NEW JERSEY ZINC CO.
National City Bank Bldg.
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ILLINOIS ZINC COMPANY
Manufacturers of
Spelter, Sheet Zinc, and Sulphuric Acid
PERU, ILL.
W. FISHER, Agent, 81 and 83 Fulton St., New York City
Telephone, 139 Beekman

HIGH GRADE SPELTER
If you want highest efficiency in Manganese Bronze and Special Alloys use
Golden Rod Brand
Manufacturers also of
Brazing Solder
H. M. SHIMER & COMPANY
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Sandoval Zinc Co.
Manufacturers of
HIGH GRADE SPELTER
SUITABLE FOR ALL PURPOSES
General Offices:
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Cold Rolled Zinc
IN COILS FOR
Drawing and Stamping
THE PLATT BROS. & CO.
WATERBURY, CT.

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High-Grade Spelter and Sulphuric Acid

HEGELER BROTHERS, DANVILLE, ILL.

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Manufacturers of
Pig and Bar Lead, Spelter, Babbitt Metals
Linotype, Stereotype, Monotype and Electrotype Metal, Yellow Composition and Phosphor Ingots
Dealers in New and Old Metals, and the Largest Buyers of Zinc Dross, Skimmings, Sal Skimmings, Scrap Zinc and Aluminum

THE MORTON B. SMITH CO.
241 and 243 Front St., New York
Offer for Sale:
HEAVY COPPER AND WIRE
Ready for the Crucible
COMPOSITION
Carefully Selected
HEAVY YELLOW BRASS
Free from Iron
OLD METALS GENERALLY

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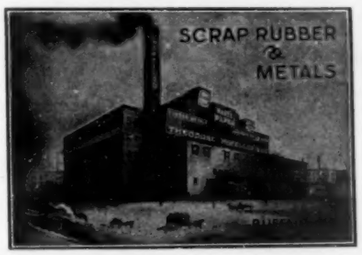
METAL SMELTERS, REFINERS, DEALERS.

BUYERS AND SELLERS OF NEW AND OLD METALS.



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BUFFALO, N. Y.

Our Specialties

Heavy Copper and Copper Wire Cut in Crucible Shape.

Number One Red Brass Scrap.

Heavy Yellow Brass Scrap.

The CRESCENT Phosphorized Metal Co.

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Manufacturers of High Grade PHOSPHOR TIN, PHOSPHOR BRONZE, PHOSPHOR COPPER, Containing up to 15% Phosphorus. MANGANESE COPPER.

Also Dealers in PHOSPHORUS. Lowest Market Prices.

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Manufacturers of

Solder, Type Metals, Babbitt Metals and White Metal Alloys

Smelters of Drosses of All Kinds — Dealers in New and Old Metals

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Skimmings, Grindings, Buffings, Sweepings **BRASS** Skimmings, Grindings, Buffings, Sweepings

WHITE & BRO., Inc.

Station K, Philadelphia, Pa.

ALBERT A. MOERS 24 Stone Street NEW YORK

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Write me to-day for attractive prices in large and small quantities. Only 98 per cent. and 99 per cent. handled. Can be used for all purposes. 250 tons per month.

MAGNESIUM METAL

is lighter than Aluminum and thus offers the means of producing strong and lightest weight Castings. Magnesium is also a good deoxidizing agent for brass foundry work.

NOTE: Always Specify "LEAVITT'S" MAGNESIUM

C. W. LEAVITT & CO.

1812 Cortlandt Bldg. NEW YORK

HOMOGEN

HOMOGEN

THE Metal Scavenger

FREE TRIAL OFFER—Send for 100 lbs. (15c. a lb., f. o. b. Cleveland). If it don't improve your Brass, Bronze and Gun Metal castings, you owe us nothing.

The ALLYNE BRASS FOUNDRY CO.

Homogen Dept. CLEVELAND, O.

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379-407 W. ONTARIO STREET, CHICAGO, ILL.

LAKE, ELECTROLYTIC AND CASTING INGOT COPPER

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BUYERS AND SELLERS OF NEW AND OLD METALS.

TELEPHONE, BRIDGE 1819. LOCK BOX 168.

SANDOVAL ZINC CO.

Chemical Department

EAST ST. LOUIS, ILLS.

Manufacturers of Soldering Flux, Commercial Salts, and Chloride of Zinc in Fused, Granulated and Liquid form.

The Granulated Chloride of Zinc is indispensable, as a flux, to Brass, Copper and Aluminum Founders.

Put up in 50 and 100 lbs. iron packages.

Price 10 cents per pound delivered in the United States.

Wm. F. Renziehausen Co.

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SWEEP SMELTERS, ASSAYERS AND ANALYTICAL CHEMISTS

Full value paid for any material containing Gold, Silver and Platinum

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LONG DISTANCE PHONE, 3759-R

M. M. ANDLER & CO.

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Dealers in METALS

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METALLIC PHOSPHORO

(Phosphor Tin Improved)

Prevents the formation of Pores, Blow-holes or Cold-shuts in Castings.

Also prevents excessive shrinkage.

THE NEW ERA MANUFACTURING CO.

KALAMAZOO, MICH.

BRASS INGOT

WHIPPLE & CHOATE, BRIDGEPORT, CONN.

For Advertisement of

U. S. REDUCTION CO.

See Page 49

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DIRECTORY

METAL FOUNDERS, FINISHERS AND SHEET METAL WORKERS.

THE LIGHT MANUFACTURING & FOUNDRY COMPANY

POTTSTOWN, PA.

ARE THE ORIGINAL AND ONLY MANUFACTURERS OF

AUTOMOBILE BRAND AERIAL BRAND ALUMINUM CASTINGS

Our Aluminum Castings are especially adapted to Automobile, Auto Boat and Aerial Construction.

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Spinning
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HOME OFFICE: NEWARK, N. J.

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EVERYTHING IN
ALUMINUM

SPECIAL GOODS made to order.
Correspondence Solicited.

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CASTINGS

BRASS, BRONZE, ALUMINUM
PHOSPHOR BRONZE
MANGANESE BRONZE

Large castings a specialty, 1000 to 3000 lbs. and up

CLUM & ATKINSON
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are a Ready Reference for Buyers and Sellers. They are classified cards better than the street signs of a business.
In no way can you get such good Trade Publicity at so slight a cost.

RATES FURNISHED FOR THE ASKING

THE METAL INDUSTRY, 99 John Street, NEW YORK

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PHONE 5308 LENOX

ETCHED NAME PLATES

SCALES, DIALS, ETC.

Etching of All Kinds on All Metals

Manufacturers of Metal Goods

Etched Advertising Novelties, Calendars, Etc., A Speciality.

Artistically Designed Engraved Signs, General Engraving, Stamping and Saw Piercing

ELECTRO GOLD, SILVER, COPPER AND NICKEL PLATING

Let us quote you prices. No order too small, no order too large. If you have anything you want manufactured in metal, write, phone, or wire.

KRIZAN & HILL, Manufacturers, 521-523 East 72nd Street, New York City

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NO JOB TOO LARGE OR TOO SMALL FOR US

NORTHERN OHIO MANUFACTURING AND REFINISHING WORKS

B. HENGST, Prop.

GOLD, SILVER NICKEL PLATING BRONZE AND BRASS

SAFETY RAZORS A SPECIALTY

Repairing of all Kinds of Metal Goods, also Lamps and Chandeliers

2069 E. 4th Street, CLEVELAND, OHIO

MAX SCHWEIZER

230 North Ave.

BRIDGEPORT, CONN.

PRACTICAL ETCHER

on Silverware, Knives, Scissors, Hardware, Signs, Clock Dials, Name and Embossing Plates, &c.

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SEND FOR RATES

METAL POLISHING AND ELECTRO PLATING

WE CAST AND FINISH ANYTHING IN METAL.

AMERICAN TOY & NOVELTY MFG. CO.,

214 W. INDIANA STREET CHICAGO, ILL.

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Books on Machinery

Books on Metals

Books on Plating

Articles on all Related Subjects

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THE METAL INDUSTRY, 99 John St., NEW YORK

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LANGDON MOORE,
Counsellor at Law and Patent Attorney
PATENTS, TRADE-MARKS, DESIGNS and COPYRIGHTS
Washington Loan and Trust Bldg., Washington, D.C.
Formerly Examiner U. S. Patent Office

HUGH L. THOMPSON
CONSULTING ENGINEER
Waterbury, Conn., U. S. A.
Plans and Specifications for Brass and Copper Sheet, Rod, Wire and Tube Mills

CHECK AND CONTROL CHEMICAL ANALYSES
Accurately and promptly made by experienced chemists at very reasonable prices.
Write for special list.
The BAYLESS CHEMICAL LABORATORY, Muncie, Ind.
"YOUR LABORATORY"

The Detroit Testing Laboratory
EXPERIENCED CHEMISTS and METALLURGISTS
Accurate Analyses at Moderate Prices
Physical Tests
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Foundry Materials — Factory Problems
DAVENPORT & KEELER
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INDUSTRIAL and SANITARY CHEMISTS
Drinking and Boiler Waters — Oils, Fats and Waxes

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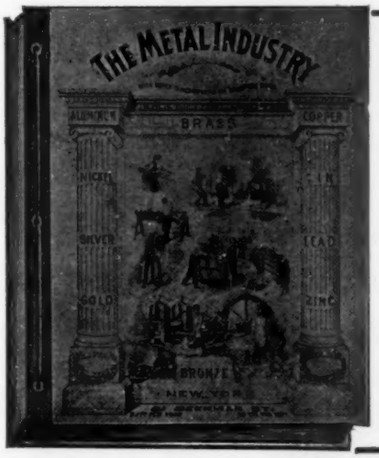

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SEE PAGE 40 FOR WANT ADVERTISEMENTS

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AN EXCHANGE FOR THE WANTS OF THE METAL TRADES

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METALS, MACHINERY AND SUPPLIES

FOR SALE—The PATENT RIGHTS of a packless steam valve which has been demonstrated to be the only practical packless valve on the market. Address J. O. EBERHARD, JR., BULLETIN BUILDING, PHILADELPHIA, PA.

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FOR SALE.—TABOR MOLDING MACHINES at reasonable price. Two of style made about four years ago and used less than one year. MILLER-HUBBARD MFG. COMPANY, Sturgis, Mich.

FOR SALE.—USED PRINTER'S BUFFS, 1¼" hole used down to about 6" diameter. Have large quantities of these used buffs for sale. MILLER-HUBBARD MFG. COMPANY, Sturgis, Mich.

FOR SALE—For BRASS FOUNDRY use, one second-hand type M. No. 2 DINGS SEPARATOR. Almost new. Address MILWAUKEE EQUIPMENT COMPANY, MILWAUKEE, WIS.

J. P. FANNING, machinist, 678 Jefferson avenue, Brooklyn, N. Y.—Maker of Moulds for Casting Solder, Babbitt Metal, Bar Lead, etc. We also manufacture small work. Write for particulars.

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FOR SALE.—A fully equipped ELECTRO-PLATING PLANT in large western city. Established four years. Profits from $175 to $200 per month. Price $2,000 if taken at once. Terms $1,200 down, balance to suit buyer. Reason for selling, death of owner. Address H. B. B., care THE METAL INDUSTRY.

FOR RENT OR SALE.—Building suitable for crucible manufactory, containing eight kilns and 50,000 square feet of floor space. Write P. O. BOX 27, Albany, N. Y.

FOR SALE.—Great opportunity to buy a first-class metallizing plant, thoroughly equipped to do a very large business. For full particulars, address D-7, care THE METAL INDUSTRY.

FOR SALE.—ELECTRO-PLATING PLANT doing a good business in the heart of the city of Boston. Good reasons for selling. WINTHROP PLATING COMPANY, 34 Beach street, Boston, Mass.

FOR SALE.—Good paying BRASS MANUFACTURING ORNAMENTAL METAL and PLATING WORKS; fully equipped; long lease; cheap rent; established thirty years; wants to sell on account of sickness; will sacrifice for $9,000, at least half cash. Address BOX 1, care THE METAL INDUSTRY.

FOR SALE OR LEASE—BRASS AND ALUMINUM FOUNDRY in Indianapolis, Ind. Thoroughly modern in equipment and appliances. Did a business last year of nearly $200,000. Second largest automobile center in United States. Over thirty automobile factories in city and vicinity. Present owner engaged in other business requiring his time. Address FRANK E. JANES, care F. E. JANES COAL AND GRAIN CO., Indianapolis, Ind.

FOR SALE—ELECTROPLATING PLANT in Brooklyn, N. Y. Good location, thoroughly modern equipment. Well established business. Excellent opportunity. Address, ELECTROPLATE, care THE METAL INDUSTRY.

WANTED

METALS, MACHINERY AND SUPPLIES

WANTED—A 10 h. p. UPRIGHT BOILER. Must be in good condition and at low cost. Address, S-1, care THE METAL INDUSTRY.

WANTED—ALUMINUM TURNINGS. The Virgina Laboratory Company, 99 Cedar street, New York, buys turnings for its own use.

WANTED.—Second hand 6 or 8 H. P. horizontal engine and boiler. State what make, condition and price. Address, HORIZONTAL, care THE METAL INDUSTRY.

WANTED—Second hand SCHWARTZ MELTING FURNACE. Must be in good condition. State particulars. Address N-11, care THE METAL INDUSTRY.

BUSINESS OPPORTUNITY

WANTED—To correspond with people who would like to become interested in a COPPER MINE in a new territory. Address, M. S. E., care THE METAL INDUSTRY.

INQUIRIES

Inquiries received by THE METAL INDUSTRY for Metals, Machinery and Supplies. Further particulars may be obtained by addressing. the inquiry number, care THE METAL INDUSTRY. No charge for inserting these inquiries.

Inquiry No. 233.—We have a large stock of soft high brass on hand in gauges 34, 35 and 36, widths from 8 to 18 inches. We would like to dispose of this stock and should like to correspond with firms interested.

Inquiry No. 234.—We would like to correspond with firms who would buy scrap nickel, such as anodes, etc.

Inquiry No. 235.—We would like to correspond with firms who are equipped to draw taper tubes of steel or iron, ten feet long, large diameter 8", small diameter 5".

Inquiry No. 236.—We are contemplating installing an automatic electro-nickel plating outfit for nickel plating and buffing lead pipe. We would like to correspond with firms who have had experience in this line. We would also like to correspond with firms who manufacture automatic tube buffing machines.

Inquiry No. 237.—We are in the market for a second-hand brass rumbler.

Inquiry No. 238.—We would like to correspond with a Mr. Chas. Hornbostel who, we understand, is handling silica wash.

Inquiry No. 239.—We would like to correspond with firms making steel molds for turning out bar solder and bearing metals. Also the manufacturers of zinc, copper and brass bars used by glaziers.

Inquiry No. 240.—We would like to correspond with firms manufacturing metal novelties.

Inquiry No. 241.—We would like to correspond with firms who manufacture sheet nickel and nickel tubes, same to be used for stampings.

Inquiry No. 242.—We should like to correspond with the various manufacturers who use phosphor-bronze in the wire form for various purposes.

SITUATIONS OPEN

SALESMEN

WANTED—A good man to sell our SPELTER in the Naugatuck Valley and vicinity. Address, stating full particulars, ZINC, care THE METAL INDUSTRY.

FOUNDERS

WANTED—BRASS FOUNDRY FOREMAN to take charge of foundry manufacturing jobbing work. Must be experienced in all lines. References required and state salary expected. Address N-1, care THE METAL INDUSTRY.

WANTED—ASSISTANT BRASS FOUNDRY FOREMAN capable of handling ten-ton capacity. State age, experience, whether married or single, wages expected. Give references. Address BOX 91, care THE METAL INDUSTRY.

BRASS FINISHER

WANTED.—BRASS FINISHER. Large jobbing brass foundry within Metropolitan district of New York desires to make connections with a first-class brass finisher and machinist. Must have some capital. A great amount of business in sight. Address D-4, care THE METAL INDUSTRY.

SPINNERS

WANTED—A METAL SPINNER who has had experience in spinning large oval bowls in German Silver and Copper. We prefer a man who is capable of figuring costs and taking entire charge of a shop doing job work. Address METAL SPINNER, care THE METAL INDUSTRY.

SHEET METALS

WANTED.—FOREMAN for SHEET METAL DEPARTMENT. Well established automobile concern; for making fenders, tanks, radiators, etc. Excellent opportunity for first-class man. Address D-2, care THE METAL INDUSTRY.

STAMP CUTTER

WANTED—STEEL STAMP CUTTER, must be capable of doing any kind of work in that line and doing it well. No boozer. Steady work to right man. State age, family, experience, wages wanted, and if convenient send samples of work. Address STAMP CUTTER, care THE METAL INDUSTRY.

PLATERS AND POLISHERS

WANTED.—An A1 FOREMAN PLATER to take charge of our plating room. Must be able to handle men, take care of his gilding and silver plating solutions. Send full particulars of former experiences, references and salary expected. Address COMPETENT PLATER, care THE METAL INDUSTRY.

TRADE WANTS

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SITUATIONS OPEN—Continued

PLATERS AND POLISHERS

WANTED.—A first-class PLATER who is thoroughly familiar with METALLIZING. Must be an A-1 man and know how to mix and work all solutions. Address METALLIZER, care THE METAL INDUSTRY.

WANTED.—WORKING FOREMAN, to take charge of twenty hard wheel polishers, on small tools, pliers, nippers, etc. State where formerly employed as foreman and salary expected. Address KRAEUTER & COMPANY, INC., No. 577 18th avenue, Newark, N. J.

WANTED.—A PRACTICAL PLATER who thoroughly understands SILVER DEPOSIT business in all its branches. First class opening for a competent man. With answers give full particulars, references, wages expected. Address D-3, care THE METAL INDUSTRY.

WANTED—PLATER to run NICKEL, BRASS and COPPER tanks and do oxidizing on HARDWARE. Must be a steady young man willing to work. Permanent position and good wages. Address, W. K., care THE METAL INDUSTRY.

WANTED—A competent foreman in the PLATING AND POLISHING DEPARTMENT for manufacturing gas and electric fixtures. Must have full experience and be good manager. Steady work, wages according to ability. If party proves competent he has a chance to join the company. Address, S-2, care THE METAL INDUSTRY.

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SITUATION WANTED—As MANAGER or SUPERINTENDENT. Energetic, aggressive, experienced in manufacture of PLUMBERS' BRASS work, valves, etc. Can handle help and get the work out. Modern methods, interchangable parts, technical education. Address, S-6, care THE METAL INDUSTRY.

SITUATION WANTED—BRASS FOUNDRY SUPERINTENDENT or FOREMAN. Thoroughly experienced on ALUMINUM CASTINGS for automobiles, valve, pump and general jobbing lines. Thirty-two years old, temperate and a hustler. Well up on molding machines and mixing metals. Address, o-2, care THE METAL INDUSTRY.

SITUATION WANTED—As SUPERINTENDENT or GENERAL FOREMAN in cast BRASS MANUFACTURING plant. Steam, water, gas and general line of BRASS GOODS. Have 20 years' experience, use modern methods and handle help to advantage. Also a large foundry experience. Address B. L., care THE METAL INDUSTRY.

CHEMISTS AND METALLURGISTS

SITUATION WANTED—As CHEMIST. A technical graduate with five years' practical experience in metallurgical laboratories. Can furnish references upon request. Address N-4, care THE METAL INDUSTRY.

SITUATION WANTED—METALLURGICAL ENGINEER. Graduate of Columbia University, two years' practice. Best of references. Address N-5, care THE METAL INDUSTRY.

SITUATION WANTED—ANALYTICAL CHEMIST, university graduate, young, active, with extensive experience in both factory and commercial work—glass, clay products, refractory materials, facings, lubricants, paints, oils, water analysis, assaying, metallurgical analysis, etc., seeks position with established concern in New York City or immediate vicinity, at moderate salary, as consultant or to assume charge of laboratory, experimental tests, etc. Excellent references. Address, "ANALYST," care THE METAL INDUSTRY.

PATTERN MAKER

SITUATION WANTED—FOREMAN METAL PATTERN MAKER experienced on steam specialties and plumbers' brass goods, also the manufacture of general brass goods. Address B, care THE METAL INDUSTRY.

FOUNDERS

SITUATION WANTED—BRASS FOUNDRY FOREMAN, forty years old, experienced in locomotive work, steamfitters' and plumbers' supplies and builders' hardware, also general jobbing. Address N-7, care THE METAL INDUSTRY.

SITUATION WANTED—BRASS or BRONZE FOUNDRY FOREMAN desires position as working foreman or superintendent. Can furnish references. Address BRONZE, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLASTER COMPOSITION FOUNDRYMAN with 9 years' experience at fine arts castings in metals, plaster, wax and glue; also for patterns for engraving machines. Address P. C. F., care THE METAL INDUSTRY.

SITUATION WANTED—FRENCH SAND MOLDER wishes a position in foundry. Experienced on ornamental and architectural bronze, statuary, gold and silver castings. Estimates given on all kinds of work. Address FRENCH SAND MOLDER, care THE METAL INDUSTRY.

CHASER

SITUATION WANTED.—By CHASER for ornamental and statuary work; 4 years' experience at Paris. Address F. C., care THE METAL INDUSTRY.

BRASS FINISHER

SITUATION WANTED—FOREMAN BRASS FINISHER, thoroughly familiar with the latest methods of manufacturing plumbers' and steamfitters' supplies, also specialties and jobbing. Has had 18 years' experience and can furnish the best references. Address N-10, care THE METAL INDUSTRY.

PLATERS AND POLISHERS

ELECTROPLATERS

Any one desiring the services of first class men for the electrodeposition of metals and finishing in all branches and departments of the plating business can secure such services by corresponding with the Secretary of the National Electro-Platers' Association, George B. Hogaboom, 656 Hunterdon Street, Newark, N. J.

SITUATION WANTED.—Expert PLATER and POLISHER up to date in all its finishes in various work and can handle help in an up-to-date manner. Address A. LEAVITT, 45 Heinkley street, Somerville, Mass.

SITUATION WANTED.—FOREMAN POLISHER and BUFFER with 20 years' experience, 15 as foreman, thoroughly up to date in the hardware and other lines. Address R. J. J., care THE METAL INDUSTRY.

SITUATION WANTED by a competent BUFFER who has had a large experience in bedstead trimmings, etc. Willing to go anywhere for a good position. Address D-6, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER who is up-to-date on all finishes and colors. Desires a position with a good firm. Salary $30 per week. Address D-1, care THE METAL INDUSTRY.

SITUATION WANTED.—By a GILDER EXPERT on shades of GOLD COLORING. Age 35. Position in Newark or New York City preferred. Address JEWELRY, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER, with fifteen years' experience, who thoroughly understands all solutions and finishes; a first-class metallizer on flowers, wood, insects, etc. Thirty-five years of age, married, sober and steady. Address N-6, care THE METAL INDUSTRY.

SITUATION WANTED—By EXPERT PLATER familiar with all up-to-date colors. Novelty plating a specialty. Address, N-8, care THE METAL INDUSTRY.

SITUATION WANTED—By an up-to-date PLATER to take charge of help. Experience in all finishes. Address N-3, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER. First-class man on nickel, brass, copper, silver, black nickel, understands all hardware finishes, etc. Address N-2, care THE METAL INDUSTRY.

SITUATION WANTED—By a first-class FOREMAN PLATER who has had many years' experience and can furnish the best of references. Would like to correspond with firms who are desirous of securing the services of a good plater. Address, S-7, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who has had charge of some of the largest plating plants in the world. Thoroughly familiar with all solutions and finishes, also plating on non-conducting surfaces, such as glass, lace, wood, plaster, etc. Address H. KEPPLER, 39 Sutton Street, Brooklyn, N. Y.

SITUATION WANTED.—A FIRST-CLASS PLATER who desires a position as foreman. Has had 22 years' experience in polishing, plating and buffing. Address BOX 188, care THE METAL INDUSTRY.

SITUATION WANTED—As FOREMAN or ASSISTANT FOREMAN PLATER. Auto lamps a specialty. Thoroughly familiar with plating in all its branches. Will accept position in New York City or out of town. Address, GEORGE, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN-PLATER who thoroughly understands the plating business from A to Z. Has had several years experience and is capable of taking charge. Address P. H., care THE METAL INDUSTRY.

SITUATION WANTED—POLISHER and PLATER wishes to change. Can furnish best of reference. Experienced on Chandeliers, Portables, Silverware, Casket Hardware and Builders' Hardware. No place too large. Address, o-5, care THE METAL INDUSTRY.

SITUATION WANTED—By a first class ELECTRO PLATER with 20 years' experience on all classes of work, 14 years as foreman plater for large concerns. Expert on all solutions, dips and finishes. Can get any finish on novelties, silverware and hardware. Can furnish best of references and would like to hear from first class firms. Address EXPERT, care THE METAL INDUSTRY.

SITUATION WANTED.—By an ELECTRO-PLATER, 18 years' experience with Nickel, Copper, Brass and Bronze solutions and oxidizing. Can furnish good reference. Address BOX M-9, care THE METAL INDUSTRY.

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Bristol Co., The, Waterbury, Conn.
Sangamo Electric Co., Springfield, Ill.

Amyl Acetate (See also Platers' Supplies).
McKesson & Robbins, New York.
Nickolas, G. J., & Co., Chicago, Ill.

Annealing Machines, Automatic.
Bates & Peard Annealing Furnace Co., New York.

Anodes, Copper (See also Platers' Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Dow Chemical Mfg. Co., Mansfield, O.
Hanson & Van Winkle Co., Newark, N. J.
Hussey, C. G., & Co., Pittsburg, Pa.
Seymour Manufacturing Co., The, Seymour, Conn.

Anodes, Nickel (See also Platers' Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Dow Chemical Mfg. Co., Mansfield, O.
Hanson & Van Winkle Co., Newark, N. J.
Levett Mfg. Co., New York.
McKesson & Robbins, New York.
Seymour Manufacturing Co., The, Seymour, Conn.

Anodes, Silver (See also Platers' Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Jackson, John J., Newark, N. J.
Renziehausen, Wm. F., Co., Newark, N. J.

Antimony Metal.
Hendricks Bros., New York.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
North American Smelting Co., Philadelphia, Pa.
U. S. Reduction Co., Chicago, Ill.

Assayers (See Chemists and Assayers).

Babbitt Metals.
Benson, H. K., & F. S., Glen Ridge, N. J.
Clum & Atkinson, Rochester, N. Y.
Eagle Smelting & Refining Co., New York.
Eastern Metal & Refining Co., Boston, Mass.
Merchant & Evans Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.

Blow Piping.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.

Brass and Bronze Covered Iron Tubes.
Phenix Tube Co., Brooklyn, N. Y.

Brass Castings.
Allyne Brass Foundry Co., Cleveland, O.
American Manganese Bronze Co., Holmesburg, Pa.
Clum & Atkinson, Rochester, N. Y.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.

Brass Ingots.
American Manganese Bronze Co., Holmesburg, Pa.
Eastern Metal Refining Co., Boston, Mass.
Genesee Metal Co., Rochester, N. Y.
Illinois Smelting & Refining Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'fd Copper Co., New Bedford, Mass.
Whipple & Choate, Bridgeport, Conn.
White & Bro., Inc., Philadelphia, Pa.

Brass, Bronze or Copper Sheet, Wire, Rod, Etc.
American Manganese Bronze Co., Holmesburg, Pa.
Ansonia Brass & Copper Co., The, New York.
Benson, H. K. & F. S., Glen Ridge, N. J.
Bridgeport Brass Co., Bridgeport, Conn.
Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y.
Hendricks Bros., New York.
Hussey, C. G., & Co., Pittsburg, Pa.
Manhattan Brass Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Pilling Brass Co., Waterbury, Conn.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co., The, Seymour, Conn.
Taunton-New B'fd Copper Co., New Bedford, Mass.
Waterbury Brass Co., Waterbury, Conn.

Brass, Bronze or Copper Tubes.
Ansonia Brass & Copper Co., The, New York.
Bridgeport Brass Co., Bridgeport, Conn.
Buffalo Copper & Brass Rolling Mill, Buffalo, N. Y.
Ellwood Ivins Tube Works, Philadelphia, Pa.
Linton & Co., Providence, R. I.
Manhattan Brass Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Phenix Tube Co., Brooklyn, N. Y.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co., The, Seymour, Conn.
Waterbury Brass Co., Waterbury, Conn.
Wells, A. H., Co., Waterbury, Conn.

Britannia Metal.
Benson, H. K. & F. S., Glen Ridge, N. J.
Standard Rolling Mills, Brooklyn, N. Y.
Toothill, John, Rochelle Park, N. J.

Bronze Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
American Manganese Bronze Co., Holmesburg, Pa.
Ansonia Brass & Copper Co., The, New York.
Clum & Atkinson, Rochester, N. Y.
Genesee Metal Co., Rochester, N. Y.
Reeves, Paul S., & Son, Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'fd Copper Co., New Bedford, Mass.

Bronze—Sheet, Wire, Rods, Etc. (See Brass, Bronze and Copper Sheets, etc.).

Bronze Tubes (See Brass, Bronze and Copper Tubes).

Brushes, Wire and Bristle
American Wire Brush Co., New York.
Blumenthal Hermann, New York.
Hanson & Van Winkle Co., Newark, N. J.
Levett Mfg. Co., New York.
Osborn Mfg. Co., Cleveland, O.
Riehl Mfg. Co., Cleveland, O.

Buckle Tongues.
Campbell-Warner Co., Middletown, Conn.

Buffing Compositions (See also Platers' Supplies).
American Tripoli Co., Seneca, Mo.
Bennett-O'Connell Co., Chicago, Ill.
Detroit Foundry Supply Co., Detroit, Mich.
Dow Chemical Mfg. Co., Mansfield, O.
Hanson & Van Winkle Co., Newark, N. J.
Levett Mfg. Co., New York.
L'Hommedieu, C. F., & Son, Co., Chicago, Ill.
Stevens, Frederic B., Detroit, Mich.

Burners, Fuel Oil or Gas (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Company, New York.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Cadmium.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Richards & Co., Boston, Mass.

Carborundum.
Carborundum Co., Niagara Falls, N. Y.

Castings. (See also name of metal wanted).

Castings, Die.
Finished Parts Mfg. Co., Newark, N. J.

Castings—Iron Machinery.
Bliss Co., E. W., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Centrifugal Dryers.
Curtis Dryer Co., Worcester, Mass.

Chemicals (See Platers' Supplies).

Chemists and Assayers.
Bayless Chemical Laboratory, Muncie, Ind.
Davenport & Keeler, New Britain, Conn.
Detroit Testing Laboratory, Detroit, Mich.
Krom, L. J., New York.
Ledoux & Co., New York.
McKesson & Robbins, New York.
Renziehausen, Wm. F., Newark, N. J.

Chemists, Manufacturing.
Dow Chemical Mfg. Co., Mansfield, O.
International Chemical Co., Camden, N. J.
Klipstein, A., & Co., New York.
McKesson & Robbins, New York.
Niagara Alkali Co., Niagara Falls, N. Y.
Roessler & Hasslacher Chemical Co., New York.
Swan & Finch Co., New York.

Chucks, Spinning.
Bliss, E. W., Co., Brooklyn, N. Y.
Pryibill, P., New York.

Cock Grinder, Automatic.
Turner Machine Co., Philadelphia, Pa.

Composition Metal Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
American Manganese Bronze Co., Holmesburg.
Eastern Metal & Refining Co., Boston, Mass.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
White & Bro., Inc., Philadelphia, Pa.

Composition Metal Tacks, Nails, Etc.
Hussey, C. G., & Co., Pittsburg, Pa.

Conveyors.
Nicholls, Wm. H., New York.
Pangborn, Thomas W., Company, New York.

Copper Castings.
American Manganese Bronze Co., Holmesburg, Pa.
Reeves, Paul S., & Son, Philadelphia, Pa.

Copper Ingots.
Hendricks Brothers, New York.
Leavitt, C. W., & Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills, Brooklyn, N. Y.
Taunton-New B'fd Copper Co., New Bedford, Mass.
Vogelstein, L., & Co., New York.
White & Bro., Inc., Philadelphia, Pa.

Copper Nails and Tacks.
Hassall, John, Inc., New York.
Hussey, C. G., & Co., Pittsburg, Pa.
Scovill Manufacturing Co., Waterbury, Conn.
Taunton-New B'fd Copper Co., New Bedford, Mass.

Copper Rivets.
Hassall, John, Inc., New York.
Hendricks Bros., New York.

Copper Sheets, Wire, Rods, Bolts, Etc. (See Brass and Copper Sheets, etc.).

Copper Tubes (See Brass and Copper Tubes).

Core Compound (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.

Core Machines (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Nicholls, Wm. H., New York.
Pangborn, Thomas W., Company, New York.

Core Ovens (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Gehnrich, Hermann, New York.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Nicholls, Wm. H., New York.
Pangborn, Thomas W., Company, New York.
Rockwell Furnace Co., New York.
Smith, J. D., Foundry & Supply Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Core Tapering Machines (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Nicholls, Wm. H., New York.
Pangborn, Thomas W. Company, New York.

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Cranes.
Detroit Foundry Supply Co., Detroit, Mich.

Crucibles, Stoppers, Nozzles, Etc. (See also Foundry Supplies).
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Gautier, J. H., & Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.
Paige Retort & Crucible Co., Taunton, Mass.
Ross-Tacony Crucible Co., Philadelphia, Pa.
Taylor, R. J., Inc., Philadelphia, Pa.

Crushers, Cinder (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Farrel Foundry & Machine Co., Ansonia, Conn.
Moussette, O. J., Co., Brooklyn, N. Y.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Cupror Metal.
Cupror Co., The, New York.

Cyanide of Potassium (See also Platers' Supplies).
Dow Chemical Mfg. Co., Mansfield, O.
McKesson & Robbins, New York.

Die-Castings.
Finished Parts Mfg. Co., Newark, N. J.

Dies, Sheet Metal Working.
Baird Machine Co., Oakville, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Draw Benches—Wire, Rod and Tube.
Farrel Foundry & Machine Co., Asonia, Conn.
Torrington, Mfg. Co., Torrington, Mass.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Drying-Out Machines.
Curtis Dryer Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Mass.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Dust Collectors.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Kirk & Blum, Cincinnati, O.
Knickerbocker Co., The, Jackson, Mich.
Pangborn, Thomas W., Company, New York.

Dynamos, Platers' and Galvanizers' (See also Platers' Supplies).
Bender, George, New York.
Bennett-O'Connell Co., Caicago, Ill.
Bogue, Chas. J., Electric Co., New York.
Dow Chemical Mfg. Co., Mansfield, O.
Hanson & Van Winkle Co., Newark, N. J.
Levett Mfg. Co., New York.
L'Hommedieu, C. L., & Sons, Chicago, Ill.

Electrical Resistance Materials.
Electrical Alloy Co., Morristown, N. J.

Electroplating, Coloring, Dipping, Etc.
American Toy & Novelty Co., Chicago, Ill.
Northern Ohio Mfg. & Refg. Works, Cleveland, O.

Enameling Ovens.
Gehnrich, Hermann, New York.
Rockwell Furnace Co., New York.
Steiner, E. E., Newark, N. J.

Engineers, Mechanical, Foundry, Etc.
Pangborn, Thomas W. Company, New York.
Thompson, Hugh L., Waterbury, Conn.

Escutcheon Pins, All Metals.
Hassall, John, New York.

Etched Name Plates.
Krizan & Hill, New York.

Exhaust Fans.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Pangborn, Thomas W., Company, New York.

Expert Instruction—Plating, Coloring, Dipping Etching, Etc.
Proctor & Stremel, Arlington, N. J.
Schweizer, Max, Bridgeport, Conn.

Flasks, Brass Moulders' (See also Foundry Supplies).
Middleditch, Benj., Detroit, Mich.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.

Forgings, Automobile.
American Manganese Bronze Co., Holmesburg, Pa.
Bliss, E. W., Co., Brooklyn, N. Y.,

Foundry Facings (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Dixon, Jos., Crucible Co., Jersey City, N. J.
McKesson & Robbins, New York.
Obermayer Co., The S., Cincinnati, O.
Stevens, Frederic B., Detroit, Mich.

Foundry Supplies and Equipment.
Birkenstein, S., & Sons, Chicago, Ill.
Detroit Foundry Supply Co., Detroit, Mich.
Middleditch, Benj., Detroit, Mich.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Nicholls, Wm. H., New York.
Obermayer Co., The S., Cincinnati, O.
Osborn Mfg. Co., Cleveland, O.
Pangborn, Thomas W., Company, New York.
Richards & Co., Boston, Mass.
Smith, J. D., Foundry Supply Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Furnace Linings (See also Foundry Supplies).
Carborundum Co., Niagara Falls, N. Y.
Detroit Foundry Supply Co., Detroit, Mich.
Rockwell Furnace Co., New York.
Stevens, Frederic B., Detroit, Mich.

Furnaces, Annealing, Brazing, Etc.
Bates & Peard Annealing Furnace Co., New York.
Detroit Foundry Supply Co., Detroit, Mich.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Furnaces, Electric.
Bristol Co., The, Waterbury, Conn.

Furnaces, Galvanizing and Tinning.
Farrel Foundry & Machine Co., Ansonia, Conn.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Furnaces, Melting, for Oil, Coal, Coke, or Gas. (See also Foundry Supplies).
Chicago-Flexible Shaft Co., Chicago, Ill.
Detroit Foundry Supply Co., Detroit, Mich.
Ideal Furnace Co., Philadelphia, Pa.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Obermayer Co., The S., Cincinnati, O.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.
Wise, J. B., Watertown, N. Y.

Furnaces, Reverberatory
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Gas Engines.
Otto Gas Engine Works, The, Philadelphia, Pa.

Gas Producers.
Otto Gas Engine Works, The, Philadelphia, Pa.

Galvanizers' Equipment (See also Platers' and Polishers' Supplies).
Dow Chemical Mfg. Co., Mansfield, O.
Hanson & Van Winkle Co., Newark, N. J.
Meaker Co., Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

German Silver Ingots, Castings, Etc.
Electrical Alloy Co., Morristown, N. J.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Seymour Manufacturing., The, Seymour, Conn.

German Silver Sheets, Wire, Rods, Tubes, Etc.
Electrical Alloy Co., Morristown, N. J.
Pilling Bros. Co., Waterbury, Conn.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co., The, Seymour, Conn.
Waterbury Brass Co., Waterbury, Conn.

Gold Alloys.
Riverside Metal Co., Riverside, N. J.

Gold Ingots, Bars, Plates, Etc.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Grinding Wheels (See also Foundry Supplies).
Carborundum Co., Niagara Falls, N. Y.

Grinding Machinery.
Bennett-O'Connell-Stevens Co., Chicago, Ill.
Carborundum Co., Niagara Falls, N. Y.
Dow Chemical Mfg. Co., Mansfield, O.
Osborn Mfg. Co., Cleveland, O.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Heat Gages.
Bristol Co., Waterbury, Conn.

Hoists, Electric, Pneumatic, Hand.
Detroit Foundry Supply Co., Detroit, Mich.

Hydraulic Machinery, Jacks, Etc.
Farrel Foundry & Machine Co., Ansonia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.

Iron, Scrap, Dealers in.
Smith, The, Morton B., New York.

Iron Tubes, Brass and Bronze Covered.
Pheonix Tube Co., Brooklyn, N. Y.

Japanning Ovens.
Gehnrich, Hermann, New York.
Rockwell Furnace Co., New York.
Steiner, E. E., Newark, N. J.

Jewelers' Equipment and Supplies (See also Platers' Supplies).

Kettles, Galvanizing and Tinning (See also Platers' Supplies).
Farrel Foundry & Machine Co., Ansonia, Conn.

Lacquering Ovens.
Gehnrich, Hermann, New York.
Steiner, E. E., Newark, N. J.

Lacquer Sprayers.
Eureka Pneumatic Spray Co., New York.
Lederer Co., F. J., Buffalo, N. Y.
Passche Air Brush Co., Chicago, Ill.

Lacquers, Metal (See also Platers' Supplies).
American Lacquer Co., Bridgeport, Conn.
Celluloid Zapon Co., New York.
Egyptian Lacquer Manufacturing Co., New York.
Eureka Pneumatic Spray Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Kalbfleisch, F. H., Co., New York.
New Era Lustre Co., New Haven, Conn.
Nikolas, G. J., & Co., Chicago, Ill.

Ladle Heaters and Dryers (See also Foundry Supplies).
Hawley Down Draft Furnace Co., Chicago, Ill.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Co., Baltimore, Md.
Rockwell Furnace Co., New York.

Ladles (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.

Lathes, Polishing (See Platers' and Polishers' Supplies).

Lathes, Spinning, Turning, Etc.
American Tool & Machine Co., Boston, Mass.
Bliss, E. W., Co., Brooklyn.
Pryibil, P., New York.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Lathes, Turret.
American Tool & Machine Co., Boston, Mass.
Foster Machine Co., Elkhart, Ind.

Lead, Antimonial.
Leavitt, C. W., & Co., New York.
Standard Rolling Mills, Brooklyn, N. Y.

Lead Castings, Antimonial.
Standard Rolling Mills, Brooklyn, N. Y.

Lead, Pig and Bar.
Hendricks Bros., New York.
Illinois Smelting & Refining Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Standard Rolling Mills, Brooklyn, N. Y.
U. S. Reduction Co., Chicago, Ill.
Vogelstein, L., & Co., New York.

Lycopodium.
McKesson & Robbins, New York.

Mahogany Pattern Lumber.
Thompson & Co., Lewis, Philadelphia, Pa.

Manganese-Bronze Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
American Manganese Bronze Co., Holmesburg, Pa.
Clum & Atkinson, Rochester, N. Y.
Electric Smelting & Alum'n Co., Lockport, N. Y.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'fd Copper Co., New Bedford, Mass.

Manganese-Bronze Sheets, Rods, Etc.
American Manganese Bronze Co., Holmesburg, Pa.
Taunton-New B'fd Copper Co., New Bedford, Mass.

Manganese-Copper.
Crescent Phosphorized Metal Co., Philadelphia, Pa.
Electric Smelting & Alum'n Co., Lockport, N. Y.
Reeves, Paul S., & Son, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Roessler & Hasslacher Chemical Co., New York.

Manganese Metal.
Leavitt, C. W., & Co., New York.
Reeves, Paul S., & Son, Philadelphia, Pa.
Roessler & Hasslacher Chemical Co., New York.

Manganese-Silicon.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.

Magnesium-Aluminum.
Leavitt, C. W., & Co., New York.

Magnesium Metal.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Roessler & Hasslacher Chemical Co., New York.

Magnetic Metal Separators (See also Foundry Supplies).
Capitol Brass Works, Detroit, Mich.
Dings Electro-Mag. Separator Co., Milwaukee, Wis.
Pangborn, Thomas W., Company, New York.

Match Plates, Aluminum
Goodale Co., The, Kalamazoo, Mich.

Metals (See name of metal wanted).

Metal-Cleaning Compounds (See also Platers' Supplies).
Anthony, H. M., & Co., New York.
Cleveland Platers' Supply Co., Cleveland, O.
Dow Chemical Mfg. Co., Mansfield, O.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
International Chemical Co., Camden, N. J.
Stevens, Frederic B., Detroit, Mich.
Swan & Finch Co., New York.

Metal Fluxes (See also Foundry Supplies).
Allyne Brass Foundry Co., Cleveland, O.
New Era Mfg. Co., Kalamazoo, Mich.

Metallurgists—Consulting.
Bayless Chemical Laboratory, Muncie, Ind.
Davenport & Keeler, New Britain, Conn.
Detroit Testing Laboratory, Detroit, Mich.
Krom, L. J., New York.
Ledoux & Co., New York.

Metals, Dealers in all Kinds of New (See also name of metal wanted).
Andler, M. M., & Co., Boston, Mass.
Birkenstein, S., & Sons, Chicago, Ill.
Merchant & Evans, Philadelphia, Pa.
Moers, Albert A., New York.

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Eagle Smelting & Refining Works, New York.
Genesee Metal Co., Rochester, N. Y.
Hofeller, Theodore, & Co., Buffalo, N. Y.
Illinois Smelting & Refining Co., Chicago, Ill.
Smith, The Morton B., Co., New York.
Riverside Metal Co., Riverside, N. J.

Metals, Dealers in Old—Gold, Silver, Platinum
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Metal Goods Made to Order.
American Toy & Novelty Co., Chicago, Ill.
Manhattan Brass Co., New York.
Reeves, Paul S., & Sons, Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.

Metal, Plated Sheet.
Benson, H. K. & F. S., Glen Ridge, N. J.
National Sheet Metal Co., Peru, Ill.

Metal Refiners, Gold and Silver.
Genesee Metal Co., Rochester, N. Y.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Metal Refiners—White Metal.
Reeves, Paul S., & Sons, Philadelphia, Pa.
Standard Rolling Mills, Brooklyn, N. Y.
Toothill, John, Rochelle Park, N. J.

Metal, Silver Plated Sheet.
Benson, H. K. & F. S., Glen Ridge, N. J.

Metal Turnings, Drosses Residue, Etc., Buyers of.
Andler, M. M., Co., Boston, Mass.
Eagle Smelting & Refining Works, New York.
Eastern Metal & Refining Co., Boston, Mass.
Illinois Smelting & Refining Co., Chicago, Ill.
Whipple & Choate, Bridgeport, Conn.
White & Bros., Inc., Philadelphia, Pa.
Smith, The Morton P., Co., New York.
Toothill, John, Rochelle Park, N. J.

Mold Dryers, Portable (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Company, New York.
Rockwell Furnace Co., New York.

Mold Spraying Machines.
Pangborn, Thomas W., Company, New York.

Molds, Ingot (See also Foundry Supplies).
Farrel Foundry & Machine Co., Ansonia, Conn.
Nicholls, Wm. H., New York.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Molding Machines (See also Foundry Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Turner Machine Co., Philadelphia, Pa.

Monel Metal, Sheets.
Marchant & Evans Co., Philadelphia, Pa.

Muntz's Metal—Sheets, Rods, Bolts, Nails, Etc.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Nails (See name of metal wanted).

Name Plates, Etched.
Krisan & Hill, New York.

Nickel.
Dow Chemical Mfg. Co., Mansfield, O.
Hanson & Van Winkle Co., Newark, N. J.
Hendricks Bros., New York.
Leavitt, C. W., & Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Standard Rolling Mills, Brooklyn, N. Y.

Nickel Castings.
Dow Chemical Mfg. Co., Mansfield, O.
Hanson & Van Winkle Co., Newark, N. J.

Nickel Salts (See also Platers' Supplies).
Detroit Foundry Supply Co., Detroit, Mich.
Dow Chemical Mfg. Co., Mansfield, O.
Hanson & Van Winkle Co., Newark, N. J.
Levett Mfg. Co., New York.
McKesson & Robbins, New York.

Nickel Silver Tubes.
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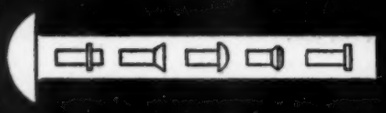

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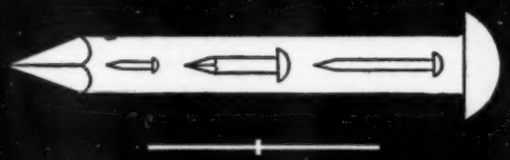

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CLAY & OAKLAND STREETS,
BROOKLYN, N.Y.

Die Castings

For all classes of work we can supply Finished Parts more ***accurate, uniform*** and ***cheaper*** than you can produce them by machinery. Estimates submitted on request.

Finished Parts Mfg. Co.
68 Orchard Street, Newark, N. J.

RICHARDS'

ALUMINUM SOLDER

IS THE ONLY REAL RELIABLE
ALUMINUM SOLDER

A SAMPLE ORDER WILL PROVE IT

JANNEY, STEINMETZ & CO.
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Books on Machinery
Books on Metals
Books on Plating

Articles on all Related Subjects
See Page 43

THE METAL INDUSTRY 99 JOHN STREET NEW YORK

FOR INDEX TO ADVERTISEMENTS SEE PAGE 47.

ALUMINUM COMPANY OF AMERICA

Pittsburgh, Pa.

Ingot ALUMINUM Alloys

Prices on Application

ALUMINUM ALLOYS

Ingots—
Granulated, Rod, Sheet
Standard and Special Alloys
Aluminum Solder

¶ Mixtures for Patterns and Castings for Special Work

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Pure Aluminum in Sheets and Foil to thinness of $\frac{1}{1000}$ of an inch. Aluminum in Ingots, Sheets, Rods, Wire and Tubing. Aluminum Solder and Rivets. Platers' Silver and Battery Plate 999 Fine. Platers' Brass, Oreide and German Silver

ALUMINUM LEAF AND POWDER FOR DECORATIVE PURPOSES

Bronze Liquid for Mixing the Powder
Send for Price List M I

165-167 SPRING STREET, N. W. Cor. of West Broadway, New York

Aluminum Solder No Flux

Mass. Institute of Technology, test 11,090 lbs. per sq. inch at soldered joint

WE HAVE THE STRENGTH

$100 REWARD

FOR ANY BROKEN PIECE OF ALUMINUM WE FAIL TO REPAIR SATISFACTORILY WITH OUR SOLDER

Solder $3.00 per lb. Sample Sticks $1.00

We have repaired tons of Aluminum

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199 Berkeley St.
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134 W. 49th St., N.Y.

The Problem of Mending Aluminum is Solved

Trade **MENDALUM** Mark

The only perfectly satisfactory Aluminum Solder, has done it

No Cleaning, Scraping, Filing or Flux is required

USE A COMMON SOLDERING IRON ON ALL LIGHT WORK, A TORCH ONLY ON HEAVY WORK

Mendalum will solder anything in Aluminum from 1-1000 inch up and will stick forever. We can furnish unimpeachable references. We have what you have long sought and are at your command.

TRIAL ORDER, 1-2 LB., $1.00

DETROIT ALUMINUM SOLDER CO.

61 Fort Street, East, DETROIT, MICH.

FOR INDEX TO ADVERTISEMENTS SEE PAGE 47

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METALS

SMELTERS REFINERS

DEALERS

ROCHESTER, N. Y.

PAUL S. REEVES & SON

1417 Catherine Street, PHILADELPHIA

CASTINGS AND INGOTS

PHOSPHOR BRONZE, MANGANESE BRONZE, COMPOSITION METALS, BABBITT METALS

ACID-RESISTING BRONZE

WHITE BRASS PHOSPHOR COPPER

CASTINGS UP TO 20,000 POUNDS IN WEIGHT.

WRITE FOR PRICES.

MANGANESE BRONZE

INGOTS, FORGINGS and RODS

Highest Grade

Bronze Castings of Every Description

MANGANESE BRONZE

PHOSPHOR BRONZE RED BRASS

and GOVERNMENT COMPOSITIONS

Quality and Uniformity Guaranteed

AMERICAN MANGANESE BRONZE COMPANY

Send for Pamphlet M. Holmesburg, Philadelphia, Pa

HEADQUARTERS FOR

High Grade Ingot Metals

OF EVERY DESCRIPTION, INCLUDING

Plastic Bronze for bearings of all kinds

Phosphor Bronze of standard specification

Manganese Bronze for castings requiring great strength

Composition Ingot according to specification, etc.

THE AJAX METAL COMPANY

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THE PHOSPHOR BRONZE SMELTING COMPANY

2200 Washington Avenue, Philadelphia, Pa.

ELEPHANT BRAND

"Phosphor Bronze"

Ingots, Castings, Wire, Rods, Sheets, Etc.

DELTA METAL

CASTINGS, STAMPINGS, *and* FORGINGS

Original and Sole Makers in the U. S.

CASTINGS for all purposes

RODS for Bushings, Pinions, Pumps, Etc.

MANGANESE-METAL

Fused 98-99% Pure.

Manganese-Copper

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The Roessler & Hasslacher Chemical Co.

100 WILLIAM ST., NEW YORK CITY

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L. VOGELSTEIN & CO.

42 BROADWAY, NEW YORK

AGENTS FOR

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Largest producers and handlers of

BRASS COPPER BRONZE

In SHEETS, TUBES and RODS

Philadelphia
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Zinc and Monel Metal Sheets

Ingot Brass and Copper

Zinc, Tin, Lead, Nickel

"Reg. U. S. M & C Pat. Off."

Manufacturers of

BABBITT METALS OF ALL KINDS

SOLDERS, TIN AND TERNE PLATES

FOR INDEX TO ADVERTISEMENTS SEE PAGE 47

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INDEX NUMBER

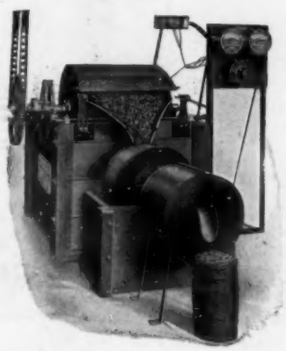
VOL. 8. NO. 12 Registered in U. S. Patent Office DECEMBER, 1910

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD. THE BRASS FOUNDER AND FINISHER
ELECTRO-PLATERS REVIEW AND COPPER AND BRASS

$1.00 Per Year 99 JOHN STREET, NEW YORK 10 Cents Per Copy

A TRADE JOURNAL RELATING TO BRASS, COPPER, TIN, LEAD, ZINC, ALUMINUM, NICKEL SILVER, GOLD, BRONZE



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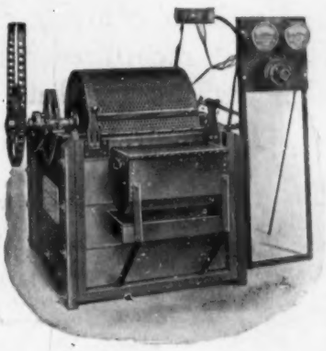
Attention of All Employees

$100 REWARD

And 10% of Damages Collected



for each and every instance, where sufficient proof is furnished leading to conviction, for the unauthorized use of our following Patented Devices:

1. PATENT AUTOMATIC SELF-EMPTYING GALVANIZING AND PLATING BARREL.
2. PATENT AUTOMATIC PIPE AND BAR IRON TANK.
3. PATENT AUTOMATIC SHEET IRON TANK.
4. PATENT CONTINUOUS WIRE TANK.
5. PATENT AUTOMATIC MOVING TANK.

All above devices are used for electro-galvanizing, as well as for any other kind of plating, as nickel, brass, copper, etc.

Our Patented Devices for

Electro Galvanizing and Plating

are acknowledged perfect in every way and superior to any others on the market; some prominent concerns after buying one device or inspecting it at our Demonstrating Plant have attempted to make the same device for their own use; although they might not steal cash, they do not seem to consider that they do steal our money and brain work, in a round-about way, by doing so.

We have decided to follow up such infringements in every instance by vigorous prosecution and pay the above for the proper information.

U. S. ELECTRO GALVANIZING CO.

1-9 PARK AVENUE, BROOKLYN, N. Y.

Contents, Page 512. Books, Page 43. Directories, Page 32. Want Ads, Page 40. Index to Advertisers, Page 47.

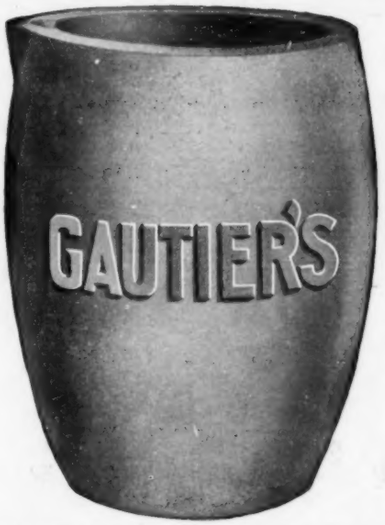
250 Percent Increase

In a Cleveland motor car factory Carborundum Grinding Wheels are grinding an average of 70 hardened steel wrist pins a day each.
The best record ever made by any other wheel in that factory was twenty pins a day each.

Carborundum is a great money saver

THE CARBORUNDUM CO.
Niagara Falls, N. Y.

THE STANDARD IN CRUCIBLES



MANUFACTURED FOR OVER 50 YEARS
J. H. GAUTIER & CO., JERSEY CITY, N. J.

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Uniform
Dependable
Satisfactory

We've been making the best crucibles it is possible to manufacture for nearly 40 years. Those who know them USE them

Write Dept. I for lists and prices

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Hudson Terminal—Cortlandt Bld'g, New York
FOUNDRY EQUIPMENT

PHOSPHORUS
For Phosphor-Bronze, Copper, Tin, Etc.
GENERAL CHEMICAL CO. MORO PHILLIPS WKS., 608 Bourse, PHILA., PA.

NOTICE. TURKEY BOXWOOD SAWDUST and Other Kinds, for Silver and Nickel Platers and Brass Goods Manufacturers. JOHN SOMMER FAUCET CO., 355 Central Ave., Newark, N. J.

KALYE
TRADE MARK.

FOR PREPARING METAL SURFACES FOR PLATING, &c.
SAMPLE CAN SENT FREE
Correspondence Solicited Mention this Jorunal
H. M. ANTHONY CO., Agent, 261 Greenwich St., New York

FOR INDEX TO ADVERTISEMENTS SEE PAGE 47

Bullish or Bearish vs. Timidity or "Faith and Nerve"

Big Railway Magnate was reported from a pessimistic standpoint speech whereas previously an "optimist." **"MONARCH"** opinion is, it is simply a **"Missouri Bluff Poker."** The problem to solve is what is a fair return to the bond and stockholder, based upon fair pay to the employee and charges to the shipper. We shall hope when the new "Czar" of the house takes his seat, the railroad president will notify the purchasing agent to "drive those clouds away" and let go those floods of **ORDERS** for all, and a good batch of held up ones for **"MONARCH MODERN FURNACES" AND ECONOMICAL FOUNDRY EQUIPMENT.**

If you want "good goods," comfort and satistisfaction and to avoid paying for unsatisfactory returns, deal with us, and begin to dispense with coke or coal for melting metals.

THE ORIGINAL "50%" SAVED

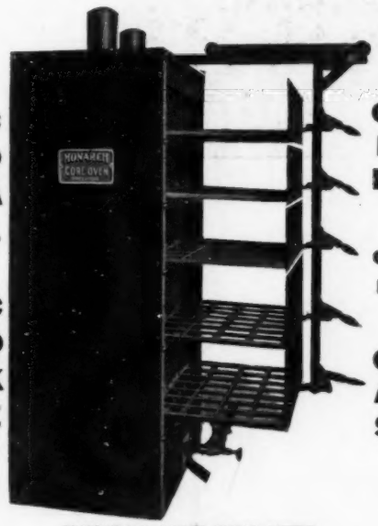
"Steele-Harvey" Crucible Tilting Furnace

LEADS "because we Specialize and Test in our Own Shops daily"

You retain your money if results are not pleasing

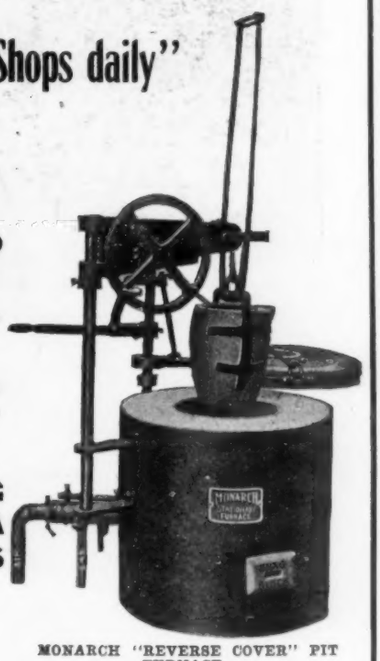
STEELE-HARVEY TILTING.

COAL COKE



MONARCH ACME CORE OVEN.

OIL or GAS



MONARCH "REVERSE COVER" PIT FURNACE.

Furnaces for little, big and all kinds castings of brass, bronze, aluminum, nickel, etc.

For brazing, welding, muffle, tempering annealing, case hardening, galvanizing, soft metals, heating, etc. Tanks, blowers, burners, ladle and crucible heaters, core ovens, etc.

Be WISE, place order now. Terms made agreeable. Immediate delivery and installation.

Our new "1910-1911" catalog—T. M. I.—No. 3.

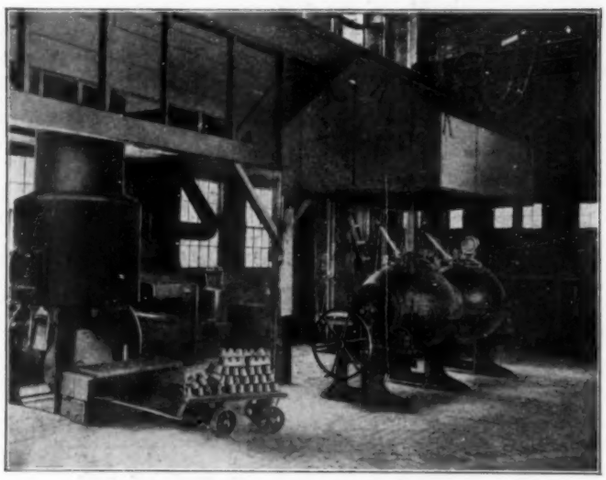
The Monarch Engineering & Mfg. Co.

1200-1206 American Building, Baltimore, Md., U. S. A.

ROCKWELL FURNACE FACTS

Cost of Melting With Oil in Rockwell Double Chamber Furnace

This article, which appeared in the November 1909 issue of a trade journal speaks for itself



The Rockwell Double Chamber Furnace in Falcon Bronze Co.'s Foundry

Editor:

I have read with interest in the October issue of a trade journal, the article by T. P. Gourley on brass melting with oil and coke. While I do not question the statement of Mr. Gourley that his cost is 18 cents per 100 lbs. of metal, it set me thinking about our own costs and I had our bookkeeper make out the following cost report for six months of this year with oil against six months of last year when we used coke for melting. It will be noted that we have saved more money by using oil instead of coke.

For the first six months of 1908 our cost of coke, crucibles, lining, etc., was **$1,918.45 for melting 632,999 lbs. of metal.** For the first six months of 1909 our **cost for oil,** crucibles, lining, etc., was **$642.59 for 609,226 lbs. of metal melted.** It will be apparent, therefore, that the following comparison can be made:

Cost of Melting with Coke, 30.3 cents per 100 lbs.

Cost of Melting with Oil, 10.5 cents per 100 lbs.

It may be of interest to say that it is necessary to know how to use oil in melting in order to obtain good results.

G. A. DOERIGHT, President.
The Falcon Bronze Company,
Youngstown, Ohio.

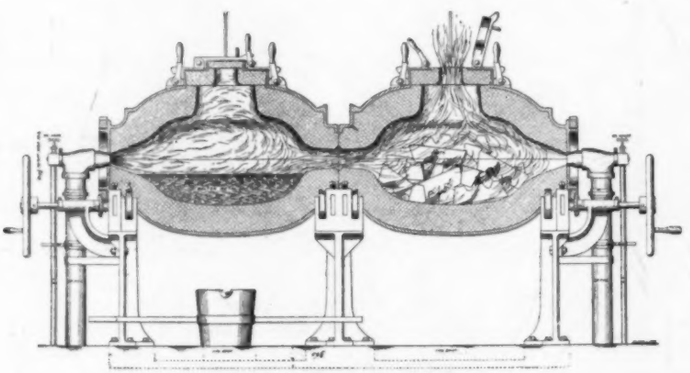
For Melting

Copper, Brass, Bronze, Iron, Aluminum, etc.

OIL OR GAS FUEL

¶ Besides the low melting cost this furnace has the advantages of no crucibles, no ashes to grind, quick heats, no heat wasted, continuous melting.

¶ Sold on approval.



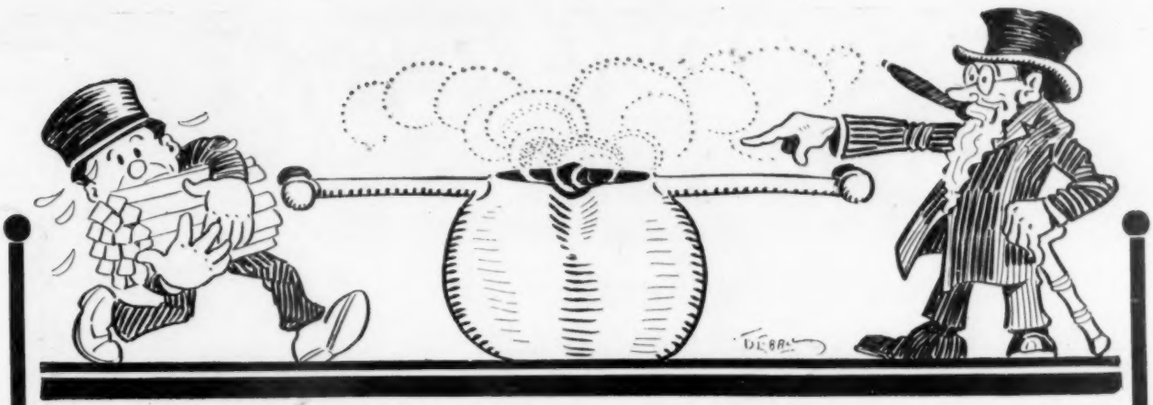
Showing Action of Heat

Remember we make Crucible Furnaces, Core Ovens, Moyer Tramrails Core and Sand Conveyers, etc.

WRITE FOR CATALOGUE "M-1"

ROCKWELL FURNACE COMPANY

26 Cortlandt St., New York **Fisher Building, Chicago**



Just because your grandfather built a wood fire in his ladles

Grandfather methods are all right for their times. In those days they heated their foundry ladles by building wood fires in them. They did it that way because wood and labor were both cheap and plentiful.

But that's no reason why you should keep up the practice. Fore times have changed and wood-fire is out of date. Make your Ladles **"Hawley-Hot."**—Not **partly** hot. Save 200° of heat in your cupola or crucible by using the

Hawley Ladle Heater

You have been running your heats just about 200° hotter than necessary just to make it hold out till your ladles were empty.

You can save that unnecessary excess, if you make your ladles **"Hawley-Hot."**

This is like finding money for you. It will pay for the Heater in a few days and after that earn dividends on your metal bills.

The Hawley Heater burns oil or gas.

It heats the ladles uniformly, through and through, inside and out, and they STAY hot.

Price, complete, delivered, $40.00

Fully guaranteed. Your money back if not satisfied. Order now!

Hawley Down Draft Furnace Co.

CHICAGO, ILL., U. S. A.

The STEWART Is The Furnace

This Metal Melting Furnace is a Direct Appeal to Your Good Judgment

We will leave the proposition entirely to the men who know what furnaces are—and know what they ought to be. We make no idle claims. The supremacy of the Stewart is upheld by what it is—not by empty statements.

Although designed primarily for melting brass (and we are told it is better than other furnaces for that), it is now in general use for melting all other metals. The linings are of special analysis fire clay to insure durability. Has no more piping than is absolutely necessary. Gives perfect combustion and allows positive control of heat at all times. From now on each one will be fitted with a special automatic device for removing the cover.

Use the Furnace Before You Pay

In order to allow the furnace to prove its own worth—in order that you may know absolutely whether you need it or not—we will allow you to use the furnace in your plant, under your patricular conditions, before you pay us any money.

Send for the catalog. It shows a complete line of Gas and Oil Furnaces and is mailed free upon request.

Chicago Flexible Shaft Company

165 Ontario Street - - - Chicago

M. R. V.

BRASS MELTING TILTING CRUCIBLE

FURNACE

DO YOU WANT THE BEST METAL?

The M. R. V. furnace, using coke, produces the best metal at lowest cost.

MY GUARANTEE

1 LB. of coke TO MELT 5 LBS. metal 6 HEATS per day; 440 LBS. per heat.

If I cannot prove these figures I will take furnace away and make no charge.

For circular M. R. V. containing fullest particulars, please apply to

J. B. WISE

Watertown New York

MELTING COSTS

You ARE interested in decreasing your Melting Cost and we are selling a furnace backed by a positive guarantee to make an appreciable reduction in your cost of melting Copper, Brass, Bronze, etc.

Can you afford to pass up, without notice, a furnace whose initial cost is lower; whose melting cost is lower, and which is foolproof?

You CANNOT if you are working for the best interests of your firm, and WILL look into the merits of the Ideal Tilting Furnace NOW.

Catalogue and full information on request.

IDEAL FURNACE COMPANY

CHESTER, PENNA.

TAYLOR CRUCIBLES

For Years the Recognized
Standard
for Uniform Service

IF INTERESTED WRITE US

ROBERT J. TAYLOR, Incorporated

1900 to 1916 Callowhill Street, PHILADELPHIA, PA.

CRUCIBLES

YOU CAN'T BUY A BETTER POT AT ANY PRICE

Special High Conductivity

RETORTS

PAIGE RETORT & CRUCIBLE CO.

TAUNTON, MASS.

When you say

ANNEALING

think of

ROCKWELL FURNACES

They will do your work and we GUARANTEE RESULTS

Write for Catalogue No. 28

W. S. ROCKWELL COMPANY

Hudson Terminal Bldg., 50 Church St., New York

(The Original Furnace Rockwell)

BRISTOL'S

Recording Instruments

For Pressure, Temperature and Electricity

Most ***Complete Line of Recording Instruments*** in the world.

Write for new Illustrated Index of Bristol Instruments, with more than 50 large illustrations.

THE BRISTOL CO.

WATERBURY, CONN

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[Size Number]
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MAHOGANY
PATTERN LUMBER

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Westinghouse Machine Company
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Westinghouse Air Brake Company
Allis-Chalmers Company
Bullock Electric Company
Pratt Engineering and Machine Company
Southern Iron and Equipment Company
Ingersoll-Rand Company
American Locomotive Company

AND MANY OTHERS

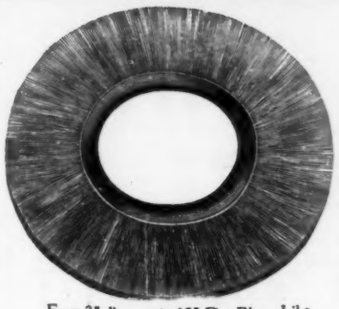
Cheap as White Pine and Better

Sample and Price on Request

Lewis Thompson & Co.
INC.
18th and Indiana Avenue
Philadelphia - Pennsylvania

YOU CAN ALWAYS BUY
Everything You Need In Your Foundry
From
The S. Obermayer Co.
EVERYTHING YOU NEED IN YOUR FOUNDRY.
CINCINNATI. CHICAGO. PITTSBURGH.

BRUSHES



From 3" diameter to 15". Five Rings Like This Make One 12" Brush.

MEZ

Patent Sectional STEEL WIRE WHEEL BRUSH

Fully Guaranteed and Warranted to be the Best on the Market.

Its light weight will amaze you. It will keep your spindles in good shape—no pounding.

Price List Complete, including metal hub. State size of arbor hole required

Flange Size	No. Brush	Diam. of Brush	Width of Face	Diam. of Hub	List Each
4	ME 8	8 ins.	1½ ins.	3 ins.	$10.20
3	ME 10	10 "	1¾ "	4¼ "	11.40
2	ME 12	12 "	2 "	5⅝ "	12.60
1	ME 15	15 "	2½ "	7¼ "	14.40

Write for Discounts.

All Kinds of Brushes for Jewelers, Silversmiths, Metal Manufacturers, Founders, Electroplaters, Polishers.

Ask for Pamphlet "MI"

AMERICAN WIRE BRUSH CO.
277 Greenwich Street, - NEW YORK

DEALERS IN BOSTON, MASS.
Chandler & Farquahar Co., The Fairbanks Co., A. J. Wilkinson Co.

Use Foundry Facings?

Are you using the best facings considered from the standpoint of real economy and true efficiency? Have you ever tried

DIXON'S FOUNDRY FACINGS?

Do you know how Dixon's compare with other facings? Isn't it worth while to *know?* If you will tell us what kind of work you do, we will send a working sample free of charge.

JOSEPH DIXON CRUCIBLE COMPANY
JERSEY CITY, N. J.

Riehl Wheel Brushes

(Patented Oct. 26, 1909.)

Sectional Tampico Wheels

MADE IN ANY SIZE.

Wire Scratch Wheels

2½" to 16" diameter any width of face.

Every brush is complete, balanced up and ready for immediate use.

SENT ON APPROVAL.

RIEHL MFG. CO., 5411 BOWER AVE. CLEVELAND, O.

OSBORN

PARTING

Increases production of castings 20 to 30 per cent.

Light in color, light in weight, contains nothing injurious to health.

Made in three grades: Osborn "Extra"; Osborn "AA" and Osborn "B"—covering every foundry requirement.

Put up in 25 and 50 lb. cases, 100 lb. kegs, or 375 lb. barrels.

PERFECTION WHITE FINISH

Works freely and produces a higher luster than any similar material on the market.

Made in three grades: 1—for cotton or muslin buffs; 2—for felt buffs as well as cotton and muslin; 3—for nickel-plating, brass and other soft metals.

Individual cases packed in soldered, air-tight, round tins.

Write today for our Foundry Supply Catalog No. 131, new edition just out

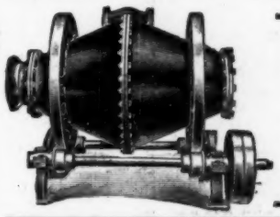
THE OSBORN MANUFACTURING COMPANY
5407 E. Hamilton Ave., Cleveland, O.

BRUSHES

Brass, Copper and Steel Wire Brushes
An assortment of Machine and Circular Brushes.—
Chandelier Manufacturers', Silver and Nickelplater's Brushes, etc.

Repairs Promptly Attended to.

HERMANN BLUMENTHAL & CO.
Manufacturers
241-243-245 CENTRE ST., NEW YORK



MONARCH CRUSHER AND PULVERIZER

Thoroughly reclaims the metal from the ashes, cinders or slag of brass furnaces.

O. J. MOUSSETTE CO., Inc.
Sole Patentees and Manufacturers
Driggs Ave., cor. N. 10th St., BROOKLYN, N. Y.

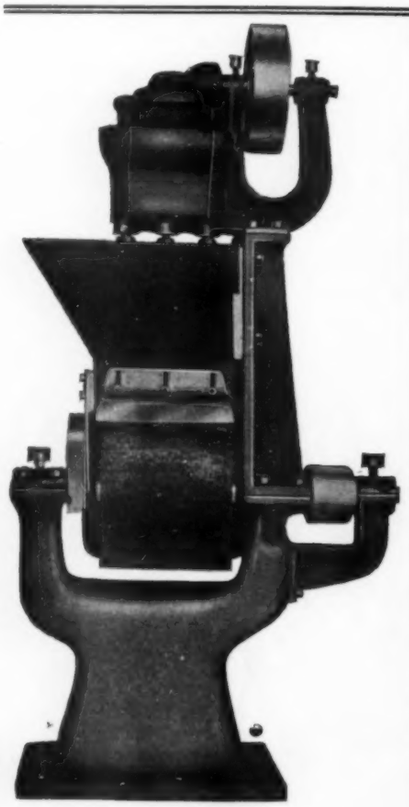
J. D. Smith Foundry Supply Co.
Cleveland, O.

FOUNDRY ENGINEERING FOUNDRY EQUIPMENT FOUNDRY SUPPLIES

No More of This Back-Breaking, Expensive Method of Sifting Sand After You Install An

IMPROVED BILZ

SAND MIXER AND SIFTER



Model No. 2.

BILZ SAND MIXER AND SIFTER

Single Hopper Type. Self-Feeding.

The automatic feed consists of three vertical worm screws placed in the hopper and driven by bevel gears, which receive power from the horizontal shaft. These worm screws feed the sand down to the brushes where it is gradually scraped away from the bottom of the hopper and thoroughly sifted and mixed, as described in Circular "BM." The only labor involved is that of keeping the hopper filled with sand. One man with this machine can keep fifty molders supplied with all the sand they can use.

The accompanying illustration shows the construction of a combined Sand Mixing and Sifting Machine, which has been placed before the foundry trade. It mixes the sand perfectly and leaves it ready for use and in better condition than can can be obtained by the hand method. It saves the cost of sieves. It eliminates danger of cuts and blood poisoning from broken wires, nails, etc., because it automatically throws out all foreign matter and deposits it in a separate pile. Sand need not be dried before sifting. The machine is strongly built, durable, uses little power, soon pays for itself, and is rapidly replacing the hand method in prominent brass, bronze and iron foundries.

Send for Circular "BM."

Special Notice

The Patents controlling the rights to make and sell Bilz Sand Mixers and Sifters in England, France and other foreign countries are for sale. Correspondence invited from interested persons.

BILZ SAND MIXING & SIFTING MACHINE CO.

1314 FINDLAY AVENUE NEW YORK

TUMBLING BARRELS

Made with hard maple barrel, lined with ⅝ in. cast iron lining, which can be easily renewed when worn. The wood deadens the noise, and will outlast several sets of lining. The barrel can be placed at any angle desired. All bearings are large, and fitted with bushings which can be easily renewed. The outer end of shaft carrying pulleys and gear is supported with heavy bracket, which keeps small gear in proper mesh with large gear. Heaviest and most substantial tumbling barrel on the market.

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DETROIT, MICH.

MANUFACTURER OF BRASS FOUNDERS' AND FINISHERS' MACHINERY

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Whether you are using a

Pangborn Modern High Pressure Sand-Blast System

or any other

dry sand is a necessity. It is harder to keep it dry in Winter and if damp it freezes.

Your sand-blast room is apt to be cold, too, and men don't work to the best advantage in cold quarters.

You can dry your sand and heat the sand-blast room at one cost with our

"PANGBORN" IDEAL SAND DRYER

It is described and illustrated on page 479 in this issue. Send for Bulletin.

We have other cold weather devices that will dry your compressed air and make the pneumatic tools work better and last longer. Ask about them.

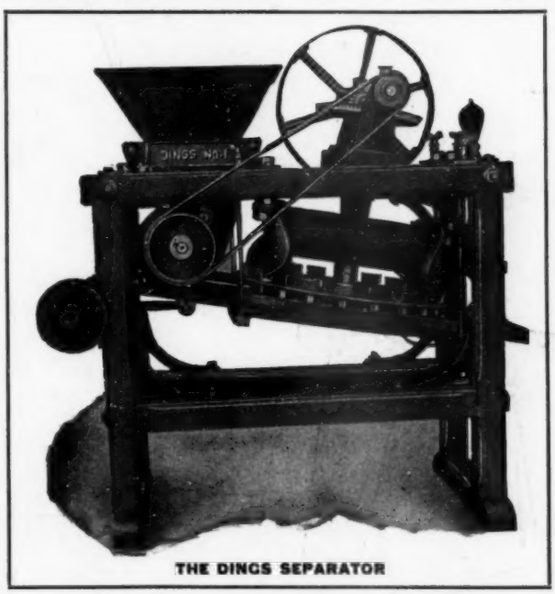
THOMAS W. PANGBORN COMPANY

NEW YORK

General Offices
89 West Street
New York

Works and Showrooms
Jersey City
New Jersey

MAGNETIC SEPARATORS



THE DINGS SEPARATOR

DIFFERENT KINDS AND SIZES MADE TO SUIT ANY REQUIREMENTS

DINGS ELECTRO-MAGNETIC SEPARATOR CO. MILWAUKEE, WIS.

NOBLE'S ELECTRO-MAGNETIC METAL SEPARATOR

MOST PRACTICAL, EFFICIENT AND ECONOMICAL

For BRASS FOUNDERS and all other purposes requiring the separation from Magnetic Metals.

Orders solicited subject to approval after 30 days' trial.

WRITE FOR CATALOGUE M AND PRICES

CAPITOL BRASS WORKS, - Detroit, Mich.

Goodale Aluminum Matchplates

For Light and Medium Weight Castings in

BRASS, BRONZE, COPPER, GREY IRON, MALLEABLE or STEEL

PAY FOR THEMSELVES

¶ They REDUCE the COST of MOLDING

¶ They INCREASE Foundry OUTPUT

¶ They PRODUCE Castings of UNIFORM SIZE and WEIGHT

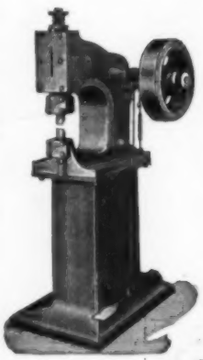
¶ They are INDESTRUCTIBLE, LIGHT, and are NEVER in the REPAIR SHOP

Better send in a pattern or two. At any rate, let us tell you more about them

THE GOODALE COMPANY

KALAMAZOO MATCHPLATES EXCLUSIVELY **MICHIGAN**

Increased Profits



for the man who cuts his Brass Castings on a Shuster Sprue Cutter. One machine does the work of several men, and the castings are trimmed so clean and close they seldom require grinding.

A powerful, substantial machine, made in four sizes, and cutting sprues up to 5/8"x2".

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Established 1866 **Catalogue on Request**

Automatic Straightener and Cutters for rounds, squares, flats, hexagons and strip stocks. Elastic Rotary Blow Riveting Machines.

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TURNER PATENT SPRUE CUTTER.
We make a foot-power sprue cutter, strong, rigid, durable. Large capacity, good adjustment, good frame. Also a heavy power sprue cutter with belt drive.

BELT-DRIVEN MOLDING MACHINE
Only ½ Horse Power required. No intricate parts. No foundation required. Built Especially for Brass Foundries.

AUTOMATIC COCK GRINDER.
With one operator will grind 400 ¾-inch cocks per day. SEND FOR DESCRIPTION.

SAND SIFTER AND MIXER.
Made with single or double heads. Requires only ½ Horse Power. Soon pays for itself.

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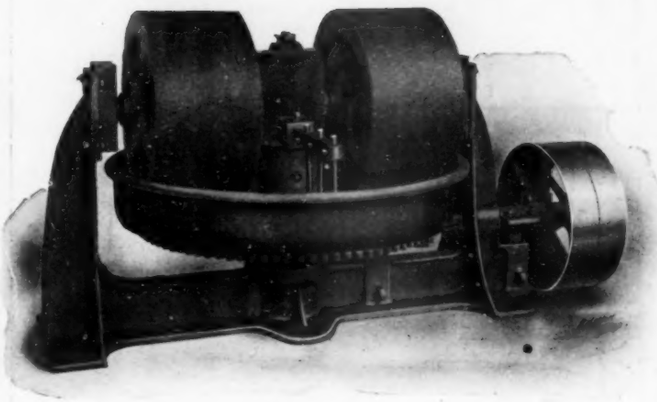
BRANCH OFFICE
1011 WILLIAMSON BUILDING, CLEVELAND, O.
BUILDER OF

Rolling Mills



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For Brass, Copper, Lead, Tin, Zinc, Aluminum, Britannia, Silver, and the softer metals—up to the largest sizes

Chilled and Gray Iron Rolls

HEAVY CASTINGS

Alligator Shears, 8 sizes — Roll Grinding Machines — Gate Shears — Railroad Cranes
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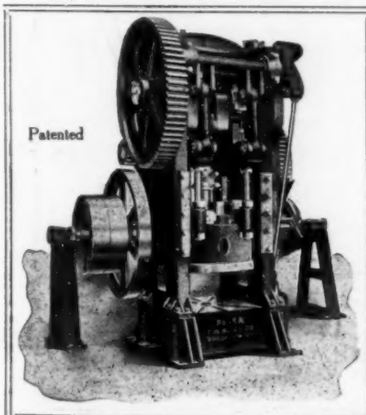
Gearing—Cut, Machine-moulded, Pattern. — Shafting, Pedestals, Couplings, Etc.



Patented

Bliss Toggle Drawing Presses

BLISS

In drawing sheet metal goods, actual continued use has proven the superiority of Bliss Toggle Drawing Presses, as fast producers of high grade work. Better and smoother work, with fewer wasters, greater durability and less consumption of power are advantages gained through the Bliss Patent Toggle movement. These presses are built in sizes to cover all requirements. Send for Catalogue No. 5a, stating requirements.

**Presses, Dies, Drop Hammers, Shears,
Double Seamers and Special Machinery**

E. W. BLISS CO., 23 Adams Street, BROOKLYN, N. Y.

Representatives for Chicago and Vicinity—STILES-MORSE CO., 562 Washington Boulevard, Chicago, Ill.

Cold Rolling Mills

Slitting and Trimming Machinery
Circular Shears
Automatic Pickling Machines

August Schmitz
Dusseldorf 64
Germany

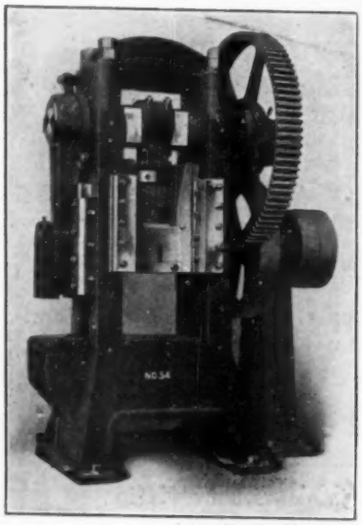
WANT TO KNOW ABOUT IMPROVEMENTS IN HYDRAULIC PUNCHES?

Then ask us for a copy of this new Watson-Stillman Catalog No. 77. Its pages list many new tools never before described in print and also all older types of punches and shears that have proven most useful and have made such an enviable name for the Watson-Stillman Co.

Tell us your requirements

THE WATSON-STILLMAN CO.
Engineers, Builders of Hydraulic Tools and Turbine Pumps
196 FULTON ST. (52) NEW YORK

BLANKING, Drawing, Shearing, Axe, Pickeye, etc., Presses, Cornice Brakes, Shears, Rolling Mill Machinery and any heavy machinery on specifications, and particularly Chilled Rolls turned, ground and polished.



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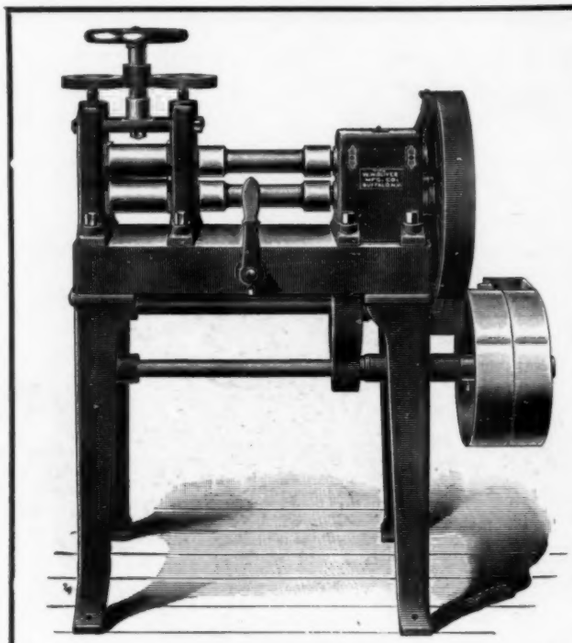
SO. MURIEL STREET, PITTSBURGH
Established 1803



Oliver Quality Rolling Mills are built in thirty different styles and sizes. Catalog No. 17 describes them. May we send you a copy?

THE W. W. OLIVER MFG. CO.
1499 Niagara St., Buffalo, N. Y.

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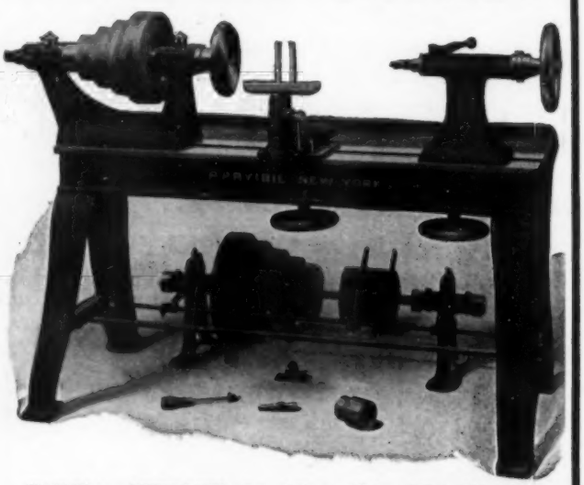

The Well-known PRYIBIL LATHE. Several Sizes, with from 12" to 44" Swing.

Our Oval Chucks have an established reputation as the best, and our new patented

Self-balancing Elliptical Chuck

is a tool no spinner can afford to be without. It greatly increases the speed and eliminates vibration. SEND FOR CATALOG.

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The TORRINGTON MANUFACTURING CO.
TORRINGTON, CONN.

Finishing Machinery for Brass and Copper Mills to Order

Acid Cleaning, Steam and Sawdust Drying-out Machines.
Power Presses, Single and Double Action Cam or Crank.
Flattening, Straightening and Overhauling Machinery.
Multiple Plunger, Cut and Carry Presses.
Slitters, Scrap Cutters and Coilers in a variety of Styles and Sizes.
Channel Iron Mill Trucks to Suit any Requirement.
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SPECIAL MACHINERY AND TOOLS OF ANY DESCRIPTION

COMPLETE FILES
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The Metal Industry
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for the years 1907, 1908 and 1909 may be obtained by placing your order before the supply is exhausted. Send for Indices and Prices.

1910 issues more interesting than ever.

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TO-DAY (THE STANDARD)

1876 NINTH REASON 1910

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WHAT OUR SUCCESS MEANS TO YOU!

Today, with over 100,000 Otto engines and over 11,000 Otto Suction Gas Producers in successful operation, The Otto Gas Engine Works, with seven factories in various countries, is the oldest and most successful company in the world manufacturing gas and gasoline engines.

Now, the significance of this to you is—The Otto company could not possibly have attained a degree of success beyond all others if the Otto products had not also been superior to all other gas and gasoline engines.

And, as noted before, it is of still further significance that this success is entirely due to the merits of the Otto Products —we having never resorted to "brass band" methods.

Now, if you are more interested in past accomplishments than present claims we want to tell you more about Otto products.

That's why the coupon is attached, so that you can drop us your name and address by tearing it out, signing and mailing it to us.

Please do this now.

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OTTO GAS ENGINE WORKS, Philadelphia, Pa.
Gentlemen—Replying to your ad in Metal Industry, December, send me catalogs, etc., together with approximate estimate for installing OTTO Engine of ..... H.P.

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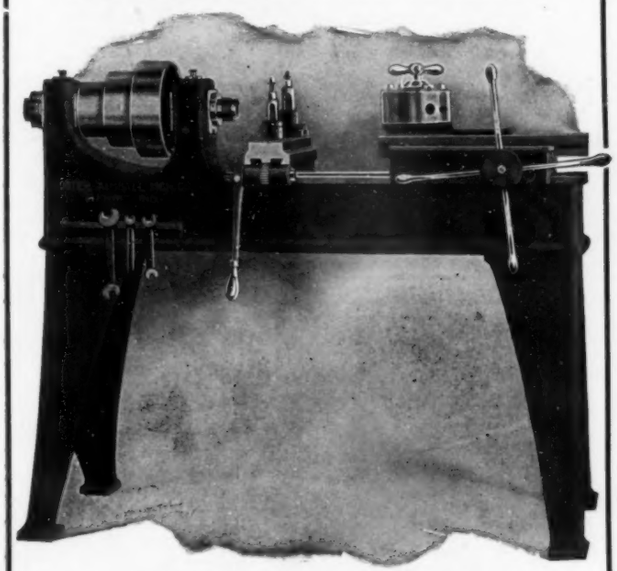
Firm Name .....
Address .....
Business .....

THE OTTO GAS ENGINE WORKS, 3223 Walnut Street, Philadelphia, Pa.

Branches: Chicago, Boston, New York, Pittsburg, Omaha, Kansas City, Minneapolis, San Francisco

PLAIN HEAD TURRET LATHE

WITH INDEPENDENT STOPS TO TURRET



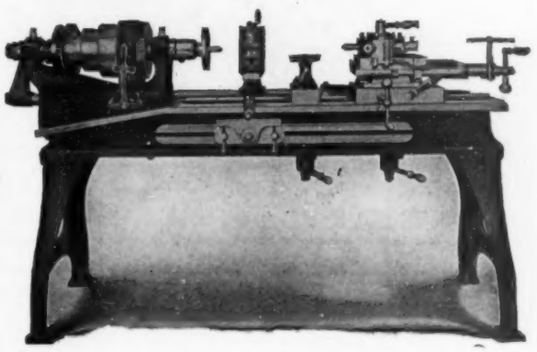
FOSTER MACHINE CO.

ELKHART, IND.

Builders of Brass Working Machinery

Lathes, For Brass and Iron Worker's Use

No. 2 IMPROVED TURRET LATHE WITH FRICTION HEAD



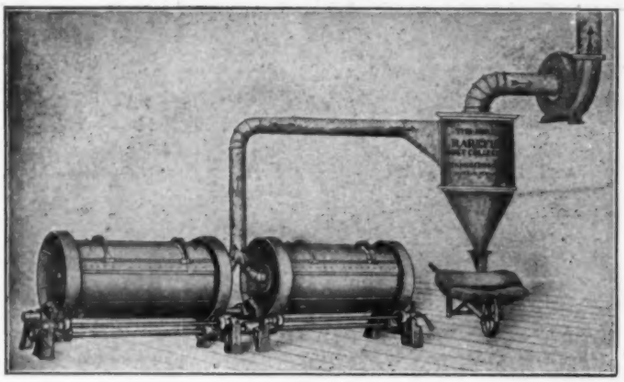
AMERICAN TOOL & MACHINE CO.

BOSTON, MASS.

Manufacturers of

Hand and Turret Lathes, Chucks, Slide Rests, Valve Milling Machines and Centrifugal Oil Extractors

Send for Catalog A. T. M.



Save All Your Brass Dust
It Is Too Valuable to Blow Away

The ... Morse Rarefied

Will Collect All the Cuttings and Dust and Stop Cutting Out of Fan

Manufactured Exclusively by

THE KNICKERBOCKER COMPANY
JACKSON, MICHIGAN

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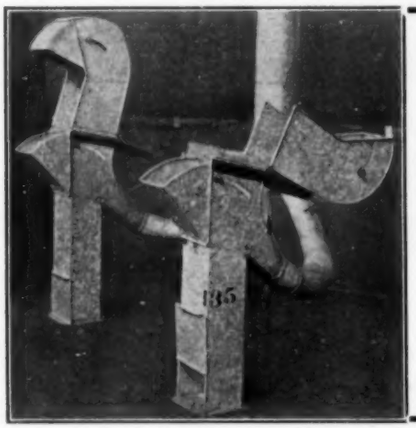


THE ECONOMY ADJUSTABLE HOOD

Will save power—Because it will operate with much less suction than any other hood on the market.

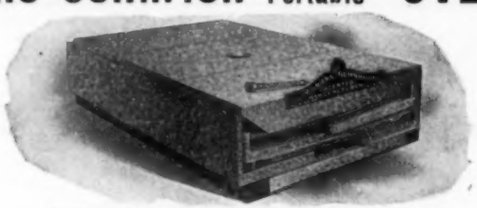
Will save time—Because it is quickly adjusted and is never in the way of the operator.

Will save material—Because the trap arrangement will not allow small pieces dropped from the operator's hand to enter the pipe and clog the system.

Only recently placed on the market, we have over 1500 in use.
We install complete systems of the latest slow speed type.
Get our price on these hoods or a complete system.
Write for list of satisfied customers.

KIRK & BLUM - - Cincinnati, Ohio

The Gehnrich Sectional Portable OVEN



Standard Size Oven Knocked Down for Shipment.

Used for JAPANNING, LACQUERING, ENAMELING, CORE BAKING, DRYING, TEMPERING, SHERARDIZING

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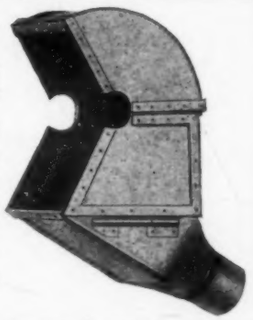
HERMANN GEHNRICH, Manufacturer 518 Water Street, NEW YORK

Clean Shop! Lower Insurance!!



Result of Dust Collecting System. We manufacture and install complete or sell you parts, such as Hoods, Exhaust Fans, Blast Gates, Dust Collectors, Blow Piping and Tanks.

CLEVELAND BLOW PIPE & MFG CO.
2096 W. 3rd St., Cleveland, Ohio

The Steiner Sectional Portable Ovens

Designed to meet special conditions. Heated by gas and adaptable for many lines of manufacture. Used for Japanning, Enameling, Baking and Drying. Has many superior advantages.

DRYING OUT BOXES
Fitted with steam coils or gas burners where steam is not available. Send for Catalogue.

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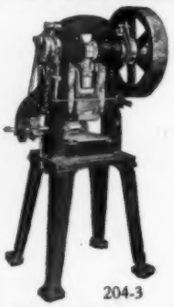

204-3

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Oakville, Conn., U.S.A.
Near Waterbury

Many new and novel features are embodied in

Baird Single Acting Presses

that make them especially valuable in any factory

Send for *Baird Press Bulletins* which contain illustrative and descriptive details

ACID TANKS WITHOUT LINING

Many users say wooden tanks for acids or chemicals should always be lined. We differ with them. In all our 40 years' experience we have never lined an acid tank, unless the purchaser absolutely demanded it.

CORCORAN TANKS NEED NO LINING

Think what a saving there is on one tank alone—Very often the cost of the lining exceeds the cost of the tank itself.
Look at the accompanying engraving.
Note how each side is grooved to receive the ends and bottom.
Also note the wrought iron rods passing entirely through sides and bottom. These rods are provided with wrought iron plates or cast iron washers and serve to keep the parts firmly in the grooves.
We warrant our tanks watertight without paint, putty or calking.
You can readily see how easy it is to put together and take apart a Corcoran Tank.
We make rectangular tanks for Galvanizing, Electroplating, etc., etc.—also Special Tanks for special purposes.

A. J. CORCORAN, INC., - - - - - 1 John Street, NEW YORK

In Your Buffing and Polishing Department

A Hatful of Bright Steel Balls will Accomplish Wonders

The Abbott Burnishing Process by means of steel balls is revolutionizing old methods of polishing and burnishing almost all kinds of small metal goods in quantities; not only because it is remarkably rapid, but also because it does better work.

None of the surface of the metal is removed by the steel balls, but they rub over the surface of the piece, burnishing and **hardening** it.

One operator can run as many Steel Ball Burnishing Barrels as are required and just one of these Barrels takes the place of several Polishing and Buffing Machines.

We'll be glad to supply you with full details. We sell either the Barrel and Balls complete or the Balls alone. **Write for Booklet ABC today.**

THE ABBOTT BALL CO., 14-18 Hicks Street, Hartford, Conn.

British Representatives: LANDER & LARSSON, 164 Edmund St., Birmingham, England.

If You Make

Buffing Compositions, Metal Polishes, Polishing Rouges, Scouring Soaps, Cleaning Compounds, or anything of similar nature, you ought to investigate

Missouri Tripoli Flour

It may be better suited for your purposes than the material you now use. *It may save you money.*

MISSOURI TRIPOLI FLOUR is made in all grades and colors—"Rose," "Cream" and "White." It is the most effective VERY FINE abrasive known. Our finest grade—"Air Dust"—is an impalpable powder, and yet a very fine abrasive.

MISSOURI TRIPOLI STONE, in its natural state, or the flour, will absorb 50% of its own weight of fluids of the consistency of water. We also make TRIPOLI STONES FOR WATER FILTERS.

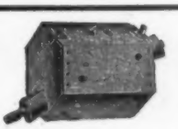
Prices upon application.

American Tripoli Company

SENECA, MISSOURI

IMPERIAL

POLISHING OR BURNISHING MACHINE



The most durable and best machine of its class ever put on the market, has stood the test and given entire satisfaction.

This machine will do the work of any six men.

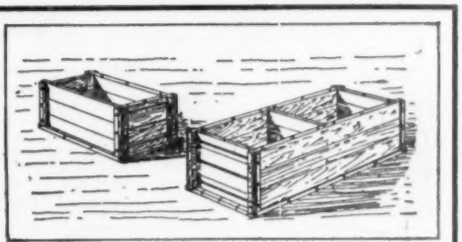
We make three styles: { One for burnishing / One for scratchbrushing / One for cutting down

Only complete line ever made.

Ask for Pamphlet MI

Manufactured by **SMITH & RICHARDSON**
Attleboro, Mass.

TANKS



Electro-Plating Tanks

A SPECIALTY

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THE A. T. STEARNS LUMBER CO., Neponset, Boston, Mass.

POLISHING WHEELS

We make canvas, linen, mill end felt, sheepskin and bull neck wheels. Made by a practical polisher, one who knows how to make wheels and how to use them. Send us a sample of your work and we will polish it up and recommend a wheel best adapted for your work and save you money on your wheel account.

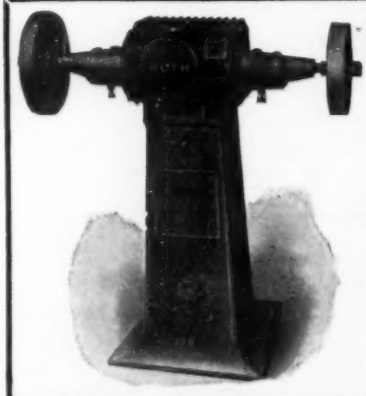
Standard White Finish

There is a reason for our Standard White Finish being better than most on the market, because it does not stick to the background after being buffed. It washes out very readily, therefore takes less time in washing, leaving the work perfectly clean and with no stains whatever.

ONE TRIAL will bring your further orders.

THE DETROIT FOUNDRY SUPPLY CO.

DETROIT, MICH. ST. PAUL, MINN. FACING FIRE BRICK FOUNDRY SUPPLIES FOUNDRY EQUIPMENT WINDSOR, ONT.



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Electric Polishing and Grinding

LATHES

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NEW YORK OFFICE,
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Importers and Manufacturers of
Platers' and Polishers' Supplies
HIGH-CLASS POLISHING WHEELS
For Grinding, Buffing and Polishing
Makers of the Celebrated "WALRINE" Leather Wheel.

AMES SWORD COMPANY

CHICOPEE, MASS.
Manufacturers of
ENDLESS SEWED POLISHING BELTS
Correspondence Solicited *Discounts Quoted*

Peerless Polishing Wheel

(Sectional View)

A rim of pieces of leather set edgewise on a center of wood and held firmly by a metallic band on which they are strung. A very durable wheel for medium and heavy work. Not affected by atmospheric changes.

Write for Circular "PW."

THE PFLEGHAR HARDWARE SPECIALTY CO.
NEW HAVEN, CONN.

THE BEST ROUGE

ON THE MARKET IS MADE BY THE
ORIENTAL ROUGE CO.
P. J. ONKEY
66-68 Pine St., Bridgeport, Conn.
SEND FOR SAMPLE

Annealing Without Oxidation by Automatic Machines

FOR NON-FERROUS METALS ONLY
BATES & PEARD ANNEALING FURNACE CO.
C. M. DALLY, Agent, 29 Broadway, N. Y.
NO PICKLING
NO SCALE
Large Saving in Labor and Fuel
Illustrated Catalogue Sent on Application.

Don't You Want Better Plating at Less Cost?

CLEAN YOUR WORK BY ELECTRICITY—and obtain a chemically clean surface, thereby insuring a firmer, more adherent deposit of metal in plating.

CLEAN YOUR WORK BY ELECTRICITY—and maintain the bright, polished surface on your work during the cleansing operation, thereby insuring a deeper lustre when the plated work is buffed.

CLEAN YOUR WORK BY ELECTRICITY—and cut out more of the manual labor in the plating room.

"ELECTRIC" CLEANING COMPOUND is composed of such ingredients as are essential to the best results in electric cleaning.

SEND COUPON TODAY

Do not put this matter off—it is too important. Our descriptive booklet, "Cleaning by Electricity," is free—it is yours for the asking. It contains some valuable information which you should know. In signing and mailing the coupon to us, you obligate yourself in no way. Detach and send us the coupon today—now—before you turn this page.

CLEVELAND PLATERS' SUPPLY COMPANY
Sole Selling Agents "Electric" Cleaning Compound,
1838 CENTRAL AVE., S.E. - - CLEVELAND, OHIO

Without further obligation on my part please send me your booklet "Cleaning by Electricity."
Name .....
Address .....
Plater Foreman at.....

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Established 1853 *Incorporated 1892*

JAS. C. PEABODY, President and Treasurer ARTHUR LEWIS, General Manager
JOHN T. LEE, Secretary

Direct Importers of Palm, Cocoanut, Olive and Cod

OILS

Refiners and Dealers in All Grades of Lubricating Oils and Greases, including Tempering Oils, Fish and Whale Oil Soaps, and

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HOME OFFICE:
151 Maiden Lane - New York

"MINERAL CLEANER"

FOR PREPARING METAL GOODS FOR PLATING, ETC.

For use on all metals, cleaning grease and oil from same, and is entirely different from anything else on the market.

Contains no fat or oil.
Will not injure the hands.
Polished work is not tarnished.
Buffing dirt is removed with little or no trouble.

It is not only cheaper than potash and other cleaners on the market, but more and better work can be done with a less quantity.

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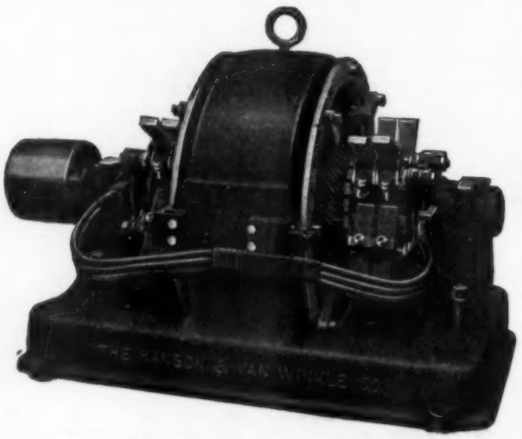
THE ELECTRIC SMELTING & ALUMINUM CO.
Sole Manufacturers LOCKPORT, N. Y.

EVERYTHING FOR PLATING and POLISHING



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WE MANUFACTURE

MULTIPOLAR DYNAMOS

giving 5 and 10 Volts and ranging from 100 to 5000 amperes on three wire system. Also from 50 to 10,000 amperes on two wire system.

Our Dynamos are known wherever low voltage machines are used.

NICKEL ANODES
NICKEL SALTS
No. 2 BLACK NICKEL SALTS
CARBONATE COPPER AND ZINC

Mechanical Electro-Plating Apparatus

United States Patents: 6-22-1897; 2-24-98; 10-11-04; 5-19-08; 2-9-09. Canada Patent No. 58205.

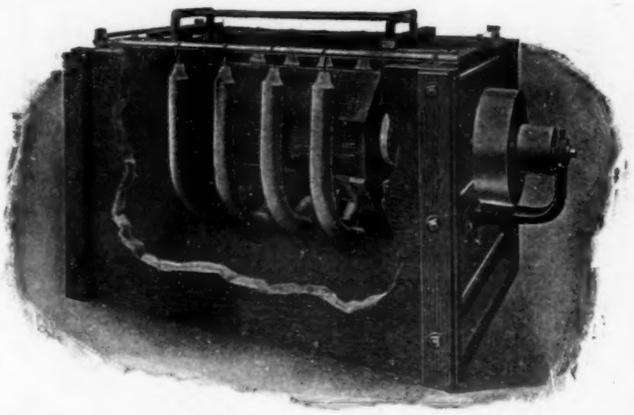
For electroplating large quantities of small work in bulk

SAVES TIME, LABOR AND EXPENSE,

and in many instances eliminates the necessity of buffing after plating.

To prove their merits we will plate sample lots free of charge

Write for Bulletin 113. This tells all about them.



PLATING APPARATUS TYPE B.

We are the Originators of and Headquarters for **COLD GALVANIZING. AMERICAN PROCESS. SAMPLES AND INFORMATION ON APPLICATION** *Write for Bulletin 117*

THE HANSON & VAN WINKLE CO.

ESTABLISHED 1820

Main Office and Factories
269-271 Oliver St., NEWARK, N. J., U. S. A.

79 Walker Street, NEW YORK
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UNIVERSAL POLISHING WHEEL

Universal by name, and in fact. The newest and positively the best wheel made. Pronounced so by experts. Ask them.

It is practically universal due to the almost unlimited range of work which it is capable of doing.

Used for Roughing, Fining or Greasing.

Replaces Felt, Bullneck and Canvas wheels.

It is economical, resilient and will not burn the surface of the metal.

Unequalled for nearly all lines of work.

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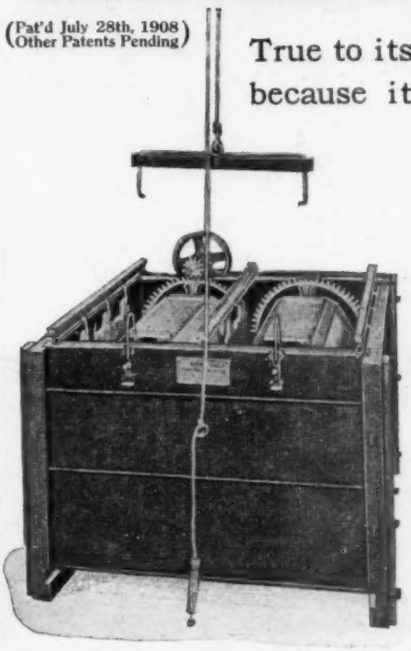
NONESUCH ELECTROPLATING MACHINE

(Pat'd July 28th, 1908)
(Other Patents Pending)



True to its name, there is none other so good, because its patented features cannot be used by any other manufacturer. These exclusive features are so good that we have already sold many machines to leading metal goods manufacturers.

Let us tell YOU about them.

ROCKHILL & VIETOR

SOLE SELLING AGENTS

114 John St.
NEW YORK

119 Franklin St.
CHICAGO

patents, formulas, good-will and property of every kind (except accounts outstanding) of the Zucker & Levett & Loeb Company. All the exclusive specialties developed by them during their 47 years of business, which could not be secured elsewhere (some of which are shown on these pages), will now be controlled by **The Levett Manufacturing Company,** whose already excellent facilities for serving the trade are thereby so enlarged and strengthened as to make them of great value to the plater or polisher who requires the most efficient and reliable equipment and supplies.

Unfilled orders on the books of the old company will be executed by **The Levett Manufacturing Company.** All new inquiries will receive prompt and courteous attention. All communications should be addressed to **The Levett Manufacturing Company,** 407 Canal street, New York.

In addition to securing all patents, formulas, etc., as mentioned above, **The Levett Manufacturing Company** have taken into their employ all of the most competent workmen formerly employed by the Zucker & Levett & Loeb Company, thus ensuring that all goods will not only be made under the same formulas, but by the identical workmen.

ANODES

We are now able to offer the trade a greater variety of styles of anodes than any other house. We offer you your choice of the following: Two-Bar Silverite, Corrugated, Diamond Shape, and Plain Flat and Curved Anodes to fit nearly every kind of plating barrels, all of which we make in all sizes, and all at the one price.

Two-Bar Silverite. Corrugated. Plain Flat.

SALTS

PLATING DYNAMOS

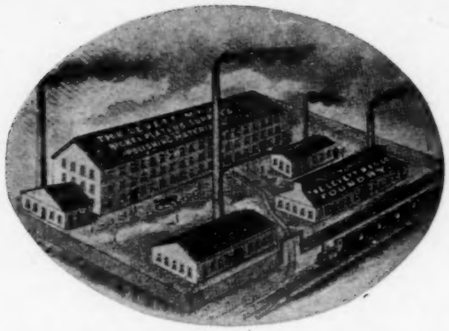
MOTORS

LATHES

COPPER CARBONATE

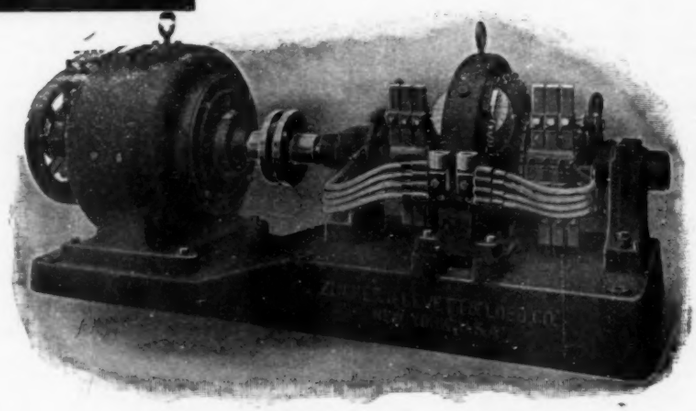
BRUSHES, ETC.

SUPPLIES



OUR PLANT AT MATAWAN, N. J.

Where we manufacture many of our specialties. Excellent shipping facilities by rail and water enable us to deliver goods to any point very promptly and assure low freight rates.



Direct-Connected Generator Set, Size G. G., Type S. H.
Low Voltage Generators, 25 to 12,500 Amperes Capacity.
Standard or Three Wire Systems.

DYNAMOS TO MEET EVERY REQUIREMENT
of the Electro-Plater, Electrotyper and Galvanizer. Write for special low prices.

Forty Years' Experience, up-to-date methods of manufacture and honest dealing are ours.

THE LEVETT

SUCCESSORS

ZUCKER & LEVETT

New York Office: 407 Canal St.

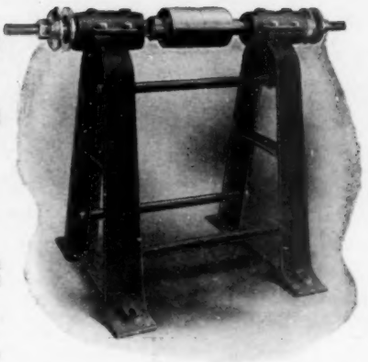
McKesson & Robbins

Importers of COCOANUT
OLIVE and COD OILS

MANUFACTURERS
USE PAASCHE PNEUMATIC BRUSHES
AND SPRAYERS

MATERIALS

We have a complete line of lathes for polishing and grinding.



Let us know your needs in this line.

ROUGES

COMPOSITIONS

VIENNA POLISH

WOOD AND LEATHER WHEELS, ETC., ETC.

The Famous TRIPLEX BUFF

You have probably heard of the remarkable records it has accomplished. Have you ever tried it yourself? Double the wear of old style buffs. 20% saving in composition. Worn down wheels can be re-made into original size at small cost

M'F'G. CO.

TO

& LOEB COMPANY

Works: Matawan, N. J.

Best quality of goods at lowest prices. Send to us for quotations.

they owned being now controlled by us, we can fairly claim to be able to offer to platers and polishers the finest and most extensive line of goods to be obtained anywhere, and the best service they have ever known. It is our purpose to so maintain the quality of our goods and the efficiency of our organization that we shall continue to deserve the reputation of being "Headquarters for All that is Newest and Best"—a house to which platers and polishers will instinctively turn, no matter what their needs, with complete assurance of getting the best that can be had, and at a fair price.

USE VICTOR WHITE POLISH

For imparting a fine lustre to nickel-plated work.

OUR FACTORY AT MATAWAN, N. J. AND OUR STORE AT NEW YORK

Our manufacturing plant consists of a number of large well-constructed conveniently arranged buildings, situated on a plot of over four and one-half acres of land. Our equipment, always adequate, is now being materially increased. The shipping facilities are also excellent, the works being served by the Central Railroad of New Jersey, the Pennsylvania Railroad, and Boat, and quick delivery to all centers of the plating and polishing trade can be assured on all orders. In this respect, as in many others, our advantages enable us to give our customers better service than they can secure anywhere else.

At our New York store, 407 Canal street, we carry a large stock of merchandise for the accommodation of the local trade.

TAKE ADVANTAGE OF THE SPECIAL PRICES

We frequently find ourselves in a position to offer special low prices on certain lines of supplies and equipment, therefore, prospective buyers will serve their own interests if they will always secure our quotations before placing orders. In these special cases everyone will be treated alike—"first come, first served"—and no favorites.

THE NIKOLAS LACQUERS

McKesson & Robbins

Importers of COCOANUT
OLIVE and COD OILS

Headquarters for

Cyanide Potash
Bismuth · Cadmium
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AND OTHER SUPPLIES FOR PLATERS AND BRASS MANUFACTURERS

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MANUFACTURERS
USE PAASCHE PNEUMATIC BRUSHES
AND SPRAYERS

Paasche Pneumatic Paint Brush in Operation

for lacquering, painting, bronzing, enameling and finishing your products. They produce the *most perfect finish* and are the *greatest time and labor-saving devices* of modern times.

Write for our catalog now.

PAASCHE AIR BRUSH COMPANY
517 NEW ERA BUILDING, CHICAGO, ILL.

We Solicit Inquiries for

BARIUM CHLORIDE

also for our other specialties

CAUSTIC POTASH, SAL AMMONIAC, PRUSSIATE OF SODA AND POTASH, ZINC AMMONIUM CHLORIDE for Galvanizing, ZINC DUST "about 92% Metallic Zinc" and other chemicals.

Get our prices before buying and mention this paper in your inquiry.

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Branches: BOSTON, PHILADELPHIA, CHICAGO, PROVIDENCE
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LACQUERING, BRONZING, VARNISHING, ENAMELING, OR PAINTING

of any description? If so, why not use the

BUFFALO AIR BRUSH

Simplest in construction, operation, and most convenient and greatest labor-saving device on the market.

Manufacturers and Patentees

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400 Guilford St., Buffalo, N.Y.

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MANUFACTURER OF

Brass and Nickel Platers' Supplies

40 and 42 WITHERS STREET
BROOKLYN, N. Y.

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ENAMEL PAINTS

White and Tints also Flat White and Tints for Metal Ceilings, Walls, Etc.

BLACK ENAMEL
ALUMINUM PAINT GOLD PAINT
Ready for use, for Radiators, Pipes, Iron Work, Etc.

ENGINE AND MACHINERY PAINTS
Black and Colors, Gloss and Flat

GRAPHITE PAINTS.
Mineral Paints for Iron Work, Roofs, Metal Shingles, Etc.

C. A. Woolsey Paint & Color Co.
JERSEY CITY, N. J.

THE NIKOLAS LACQUERS

are GUARANTEED Superior to
all others for Durability and Finish

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NEW YORK

G. J. NIKOLAS & CO.

1227-1229 Van Buren St.
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ZAPON LACQUERS

14 KARAT GOLD DYE, No. 6436

For Use with SPECIAL ZAPON No. 1203

Gives a splendid 14K Gold color on low brass and a rich yellow color on high brass.

Samples and directions on request.

CELLULOID ZAPON CO.

Factory: STAMFORD, CONN. Office: 310 FOURTH AVENUE, NEW YORK CITY

SPRAY

YOUR LACQUER, ENAMEL, PAINT
JAPAN, BRONZE, VARNISH, ETC.

DO BETTER WORK
SAVE 50% LABOR

EUREKA PNEUMATIC SPRAY CO.
276 SPRING STREET, NEW YORK
THE ORIGINATORS

Any Metal Finisher

Can Improve His Work

by protecting his metal finish with Egyptian Lacquer.

He can do more and better work with less Egyptian Lacquer.

Trial orders for inspection and test sent free of charge.

The Egyptian Lacquer Manufacturing Company
152 Front Street, New York City

"New Era" Lacquers HAVE QUALITY

We Buy Quality, Talk Quality, GIVE QUALITY

"Quality is the underlying principle of the most successful businesses."

The manufacturer who calls your attention to the low price of his product has little else to talk about. While we try to keep within the bounds of Low Prices, we do not make a specialty of it.

We can satisfy anyone who is wise enough to see the value of the BEST regardless of the shade difference in the cost.

THE NEW ERA LUSTRE CO.

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SUPERIOR SPRAYING
LACQUER ENAMELS

White, Transparent and Colors
EUREKA PNEUMATIC SPRAY CO.
276 Spring Street, New York

LACQUERS

We Manufacture
ALL KINDS
For Every Kind of Work
Gold Lacquers a Specialty
For further information write
THE AMERICAN LACQUER CO., Bridgeport, Conn.

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WATERBURY, CONNECTICUT.

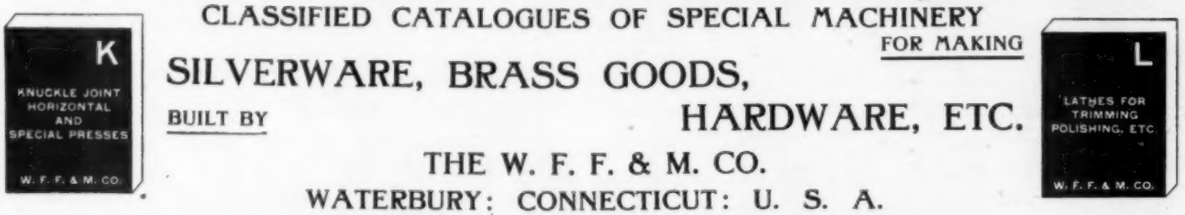
CLASSIFIED CATALOGUES OF SPECIAL MACHINERY FOR MAKING

SILVERWARE, BRASS GOODS, HARDWARE, ETC.

BUILT BY

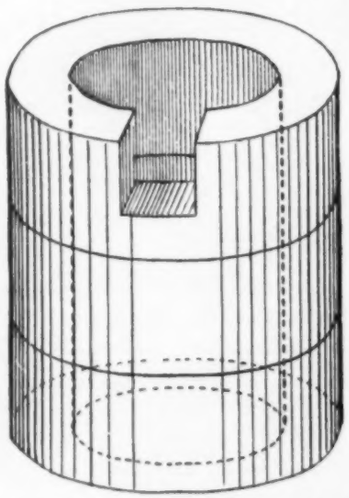
THE W. F. F. & M. CO.

WATERBURY: CONNECTICUT: U. S. A.



CLEVELAND OFFICE:
1012 WILLIAMSON BUILDING.

PHILADELPHIA OFFICE:
REAL ESTATE TRUST BUILDING



They Save the Furnace

The cost of linings for brass furnaces is quite a factor in the annual expense of the brass foundry.

STEVENS' BRASS FURNACE BLOCKS

are made of the toughest materials obtainable. Strong and refractory, and make a perfect circle.

Their use means the saving in repairs and in delays, in shutting down for putting in a new lining; the actual cost, therefore, is not at the beginning, but at the end.

Close joints. No chance for clay to fall out and fire to work in. It is at the joints where the trouble begins.

No. 1, 20-inch shell, two courses, 18 inches high.
No. 2, 23-inch shell, three courses, 27 inches high.
No. 3, 32-inch shell, three courses, 30 inches high.

Blocks make a 3-inch wall, as shown by cut above. The larger diameter is that of the crucible pit before blocks are in position; smaller diameter is that of the crucible pit when lining is in position. Any size made to order.

Any fire clay may be made into blocks as easily as in fire-brick shapes; just as there are cheap fire-brick and good fire-brick, so there are cheap furnace blocks and good ones, and the price differs as the quality differs.

Stevens' Furnace Blocks are both—the best and the cheapest—at the end. I have fire-brick made from the same clay to resist high heats, for forges, etc. This is now the patching period. To patch little, use the best material.
I manufacture Foundry Facings, Foundry Supplies and Polishers' and Platers' Supplies.

FREDERIC B. STEVENS . . . . Detroit, Michigan

MANGANESE BRONZE

THE best and strongest Manganese Bronze is made from our Manganese Copper, free from iron and other impurities. We supply the alloy all ready to melt and add zinc. Write us for particulars and prices.

We also make Silicon Copper, Aluminum Bronze, different grades, Light Aluminum Casting Alloys and Alloys to order.

THE ELECTRIC SMELTING & ALUMINUM CO.

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BRASS FOUNDERS

Do you use Phosphor Tin?

If you are an up-to-date foundryman you know that the right way to put phosphorus in your alloys is in the form of Phosphor Tin, for stick phosphorus is not only a dangerous substance, but when plunged into molten metal only a small amount enters the alloy and the rest goes up in smoke.

While we carrry in stock the ordinary brands of Phosphor Tin, we recommend the "Malta." This brand is the standard for quality and is the only one we know of which has given universal satisfaction.

Try it and see for yourselves. Also just remember that we have in stock, ready for immediate shipment, every metal the brass founder needs. Also Crucibles.

RICHARDS & CO. (Incorporated)

200-206 CAUSEWAY STREET
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Boston, Mass.

ESTABLISHED IN 1812

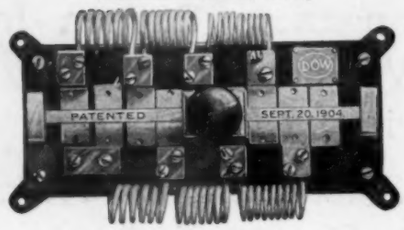
FOR INDEX TO ADVERTISEMENTS SEE PAGE 47

Type "D" Tank Rheostat

THE RHEOSTAT WITHOUT SPRINGS

EVERYTHING FOR PLATING and POLISHING

[Patented Sept. 20, 1904]



PURE TRINIDAD ASPHALT TANK LINING

"IX" Vienna Lime Composition

THE DOW CHEMICAL MFG. CO.
MANSFIELD, OHIO

FRANKLIN H. KALBFLEISCH CO.

Manufacturers of Acids, Ammonia, Chemicals and Lacquers

CHEMICALS—LACQUERS

Metropolis Bldg., Broadway and 16th St.

Works at Brooklyn, N. Y., Waterbury, Conn., Erie, Pa., Elizabeth, N. J.

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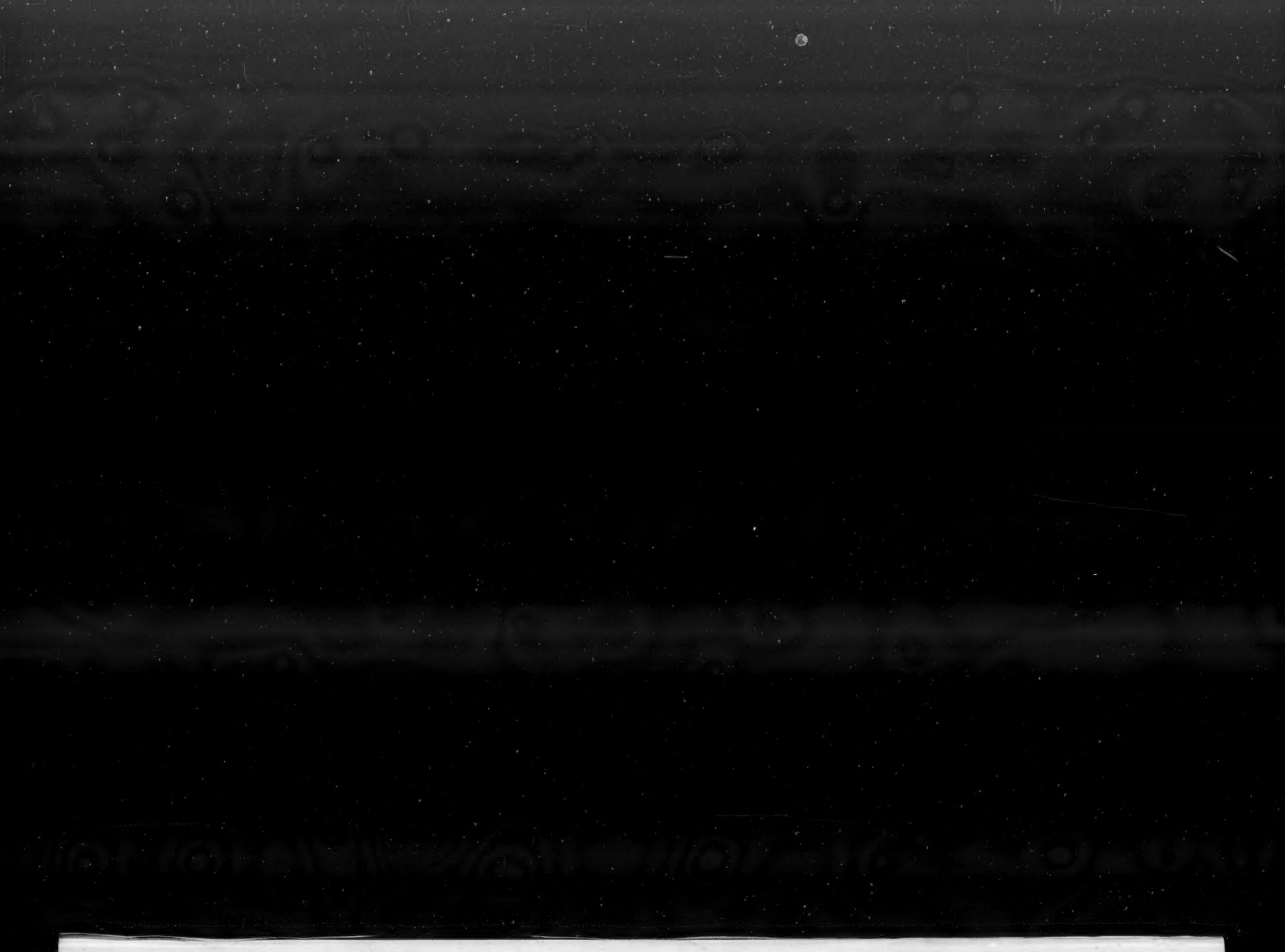
Special Cleaners for Preparing Metal Surfaces

For PLATING TINNING DIPPING GALVANIZING JAPANNING LACQUERING

No Charge for Expert Advice *Difficult Problems Investigated*

INTERNATIONAL CHEMICAL COMPANY, CAMDEN, N. J.

Chemicals for the cleaning of metals our specialty

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